

Rain and Raids Revisited: Disaggregating Ethnic Group Livestock Raiding in the Ethiopian-Kenyan Border Region

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ABSTRACT

We revisit the conclusion from the 2009 paper by Witsenburg and Adano that livestock raids are more common in wet seasons and wetter years. Those findings were based on aggregated data from Marsabit District in Kenya where over six different ethnic groups live. However, after finding opposite results in Turkana District, where mostly Turkana live, Ember et al. 2012 raised the possibility that different ethnic groups with differential dependence on pastoralism might have different patterns. Using rainfall from NASA and violence data from ACLED for the years 1998-2009, we looked at the patterns of livestock-related violence for six different ethnic groups that have a home in Marsabit District. We find that it is primarily the Borana of Marsabit Mountain and Borana Plateau--that have more livestock raiding in wet times than the other agro-pastoral groups of the region. We conclude that research on raiding needs to consider ethnic differences in subsistence strategies, mobility, and labor requirements.

KEYWORDS

Livestock raiding, East Africa, ethnicity, pastoral conflict

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INTRODUCTION

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The conclusion drawn from Witsenburg and Adano's paper that scarcity does not play much of a role in livestock raiding has received considerable attention and apparent acceptance.⁵ The Witsenburg and Adano study analyzed livestock raiding and rainfall in Marsabit District of Kenya and found that livestock raiding was more intense in wet months and in wetter years.⁶ However, Ember *et al.* found the opposite pattern in northwestern Kenya in Turkana district, an adjacent area of Kenya.⁷ Analyzing data from 1998-2009, Ember *et al.* found that livestock raiding was more intense in drought years, dry months, and in months that were drier than normal.⁸ The Ember *et al.* finding was consistent with the scarcity hypothesis. In their concluding section, they suggested some possible methodological and theoretical reasons for the discrepancy between their results and those of Witsenburg and Adano. The purpose of this paper is to test those hypotheses by analyzing livestock-related violence and rainfall patterns for the six main ethnic groups that reside in Marsabit -- Borana, Dassenech, Gabra, Garre, Rendille, and Samburu, comparing them to each other and to the Turkana. We do not limit ourselves strictly to the livestock-related violence that occurred just in Marsabit District however. This is because some of the ethnic groups have larger territories that extend into neighboring districts and other countries. Rather we take the 6 main agro-pastoral ethnic groups in Marsabit plus the Turkana and analyze the patterns for each ethnic group separately and combined.

Let us turn now to some of the reasons Ember *et al.* suggested for the discrepancy between their results and those of Witsenburg and Adano.⁹ First, Witsenburg and Adano did not disaggregate violence by ethnicity nor did they disaggregate rainfall by subregions of Marsabit, so different patterns for different ethnic groups may have been obscured by aggregation. Second, Ember *et al.* suggested that except possibly for the Gabra, the Marsabit groups depended more on

⁵ Karen M. Witsenburg and Wario R. Adano, 'Of Rain and Raids: Violent Livestock Raiding in Northern Kenya', *Civil Wars* 11/4 (2009) pp. 514-38; Patrick Meier, Doug Bond and Joe Bond, 'Environmental influences on pastoral conflict in the horn of Africa', *Political Geography* 26/6 (2007) pp. 716-35; Halvard Buhaug, 'Climate not to blame for African civil wars', *Proceedings of the National Academy of Sciences* 107/38 (2010) pp. 16477-482.

⁶ See also Wario R. Adano and Karen M. Witsenburg, *Surviving Pastoral Decline: Pastoral Sedentarisation, Natural Resource Management and Livelihood Diversification in Marsabit District, Northern Kenya*, (PhD Thesis, University of Amsterdam, 2004); Karen M. Witsenburg and Wario R. Adano, 'The Use and Management of Water Sources in Kenya's Drylands: Is There a Link Between Scarcity and Violent Conflict?', in Bill Derman, Rie Odgaard and Espen Sjaastad (eds.) *Conflicts Over Land and Water in Africa* (Oxford, UK: James Currey, 2007) pp. 215-38; Wario R. Adano, Ton Dietz, Karen Witsenburg, and Fred Zaal, 'Climate Change, Violent Conflict and Local Institutions in Kenya's Drylands', *Journal of Peace Research* 49 (2012) pp. 65-80.

⁷ Carol R. Ember, Teferi Abate Adem, Ian Skoggard and Eric C. Jones, 'Livestock Raiding and Rainfall Variability in Northwestern Kenya', *Civil Wars* 14/2 (2012) pp. 159-81.

⁸ *Ibid.* p. 175.

⁹ *Ibid.* pp. 177-78.

agriculture than the Turkana and they postulated that this difference may account for the different results. Why? While the rainy season might provide 'plenty' for a pastoralist, it is not typically a time of 'plenty' for agriculturalists; the rainy season is when crops are planted and stored supplies have often run out. The clear implication from Ember *et al.* is that interpreting the rainy season as a time of plenty may be incorrect for some ethnic groups. Third, Ember *et al.* proposed that different mobility strategies may also promote different patterns of raiding. For example, the Gabra, who live in an area without rivers, cooperate with the Borana during the dry season by providing labor in exchange for water from deep wells, whereas the Turkana, especially in drought years, head for riskier borderland regions in search of better pasture.

To summarize our results briefly, we find that the different ethnic groups show different patterns and, aside from the Gabra, it is only the more pastoral groups that display a Turkana-like pattern. The more agricultural Borana are one of the largest ethnic groups in Marsabit District and are associated with about half the livestock-related fatalities reported for the six ethnic groups. Indeed, when we aggregate the data, the overall pattern looks like the Borana pattern. Our results cause us to question the generalizability of the Witsenburg and Adano findings regarding rain and raids.

ETHNOGRAPHIC BACKGROUND

The Ethiopian-Kenyan border area is home to the Borana, Dassenech, Gabra, Garre, Rendille, Samburu, Turkana and other smaller ethnic groups. For much of the past, these communities primarily subsisted on *nomadic herding*, the culturally preferred way of life across the lowlands of eastern Africa. Yet, household level surveys and ethnographic studies conducted in the early 1990s and late 2000s show that a majority of people have become less reliant on nomadic herding.¹⁰ The reasons include the loss of former rangelands to private investors, game parks, livestock loss due to recurrent catastrophes, diseases, and human predation.¹¹ Household-level responses to these challenges have led to the emergence of four broadly contrasting livelihood groups, consisting of principally nomadic herders, agro-pastoralists, settled farmers, and those subsisting on other (non-pastoral and non-farming) activities. While all these types of households occur in each ethnic group under consideration here, the proportions vary by ethnic

¹⁰ John G. McPeak, Peter Little and Cheryl Doss, *Risk and Social Change in an African Rural Economy: Livelihoods in Pastoralist Communities* (New York, NY: Routledge, 2012); Elliot Fratkin and Eric Abella Roth, 'The Setting: Pastoral Sedentarization in Marsabit District', in E. Roth and E. Fratkin (eds.) *As Pastoralists Settle: Social, Economic, and Health Consequences of Pastoral Sedentarization in Northern Kenya* (New York, NY: Kluwer Academic Publishers, 2005) pp. 29-52.

¹¹ Adano and Witsenburg (note 2).

group.¹² McPeak *et al.* note that there is a *strong spatial and cross-cultural element* of variation. Our general expectation is that these variations will be associated with different seasonal and yearly patterns of livestock-related violence.¹³

After a brief review of the different ethnic groups we deal with in this paper, we order them on dependence on agriculture versus pastoralism and also discuss some other differences that may also affect their patterns of violence.

Borana

The Borana are part of the Oromo peoples who, with an estimated population of 40 million, constitute the largest single ethnic group in Ethiopia.¹⁴ Borana Oromos also live on the Kenyan side of the border where they constitute a demographic majority in central Marsabit district, and a co-dominant or minority group in parts of the neighboring Moyale, Mandara, Isiolo and Garrisa districts. Much of Boranaland is remote where central control by both the Ethiopian and Kenyan governments remains relatively minimal.

The traditional Borana economy greatly depended on nomadic herding, yet, contemporary Borana livelihood systems combine herding with farming and trade and wage work where there is access to markets.¹⁵ In areas with sufficient rainfall to grow crops, such as the Borana plateau of Ethiopia, the Borana have adopted plow-based agriculture as their principal economic activity. There are also farming Borana communities along Marsabit Mountain in Kenya and in pockets of relatively wet areas further south in Isiolo and Laikipia district.

In terms of ethnic relations, reports show that nomadic Borana communities on the far eastern borders of Ethiopian Borana have lately entered into frequent armed conflicts with the neighboring Garre and Degodia Somali ostensibly over border issues resulting from changes by

¹² For example, see discussion of Rendille in Elliot Fratkin, Eric Abella Roth and Martha A. Nathan, 'When Nomads Settle: The Effects of Commoditization, Nutritional Change, and Formal Education in Ariaal and Rendille Pastoralists', *Current Anthropology* 40/5 (1999) pp. 720-35.

¹³ McPeak *et al.* (note 6) p. 90.

¹⁴ Ethiopia Central Statistical Authority, *The 2005 Population and Housing Census of Ethiopia, Result for Oromiya Region. Vol. 1* (Addis Ababa, Ethiopia: Central Statistical Authority, 2007).

¹⁵ Gudrun Dahl, *Suffering Grass: Subsistence and Society of Waso Borana*, (Stockholm, Sweden: U Stockholm, 1979); Gufu Oba, 'Shifting Identities along Resource Border: Becoming and Continuing to be Borana Oromo', in P.T.W. Baxter, Jan Hultin and Alessandro Triulzi (eds.) *Being and Becoming Oromo: Historical and Anthropological Enquiries* (Uppsala: Nordiska Afrikainsitutet, 1996) pp.117-31; McPeak *et al* (note 6).

the Ethiopian government following the 1995 constitution.¹⁶ The Borana claim that the new border unfairly placed two of their ancient deep wells on the Somali side.¹⁷

Dassanech

The Dassanech, also known as Merille, are traditionally nomadic pastoralists, mostly living on the northern shores of Lake Turkana and along the eastern banks of the Omo delta in the present Dassanech district of Ethiopia. Their traditional territory also extends to parts of the adjacent Chalbi desert of north central Kenya where the Gabra are the majority. Dassanech relations with neighboring Turkana, Gabra, Borana and Nyangatom, has been, for the most part, characterized by cyclical conflicts.¹⁸

According to a 2007 Ethiopian government census, the Ethiopian Dassanech number 48,067 people.¹⁹ While livestock herding remains a significant source of income, many Dassanech also earn equally significant income from agriculture. The latter involves growing food crops (mostly sorghum, millet and beans) using both seasonal rains and soil moisture on flood retreats along the banks of the Omo River. Other subsidiary economic activities include fishing, especially on the northern shores of Lake Turkana, and seasonal employment in irrigated large-scale commercial farms. The Ethiopian Dassanech have lost considerable rangeland because of the creation of game reserves and state farms established by the then socialist government of Ethiopia. The Ethiopian government has also drawn a comprehensive plan of resettling all Dassanech of the lower Omo into permanent villages where the mainstay economy would be irrigation agriculture.²⁰

Gabra

¹⁶ Turton, David (ed.), *Ethnic Federalism: the Ethiopian Experience in Comparative Perspective*. (Oxford, UK: James Currey, 2006).

¹⁷ McPeak *et al.* (note 6).

¹⁸ Toru Sogu, 'Sharing System of the "Scarce Resources" in Southern Ethiopia', in Svein Ege, Harald Aspen, Birhanu Teferra and Shiferaw Bekele (eds.) *Proceedings of the 16th International Conference of Ethiopian Studies* (Trondheim, Norway: NTNU-Trykk, 2009); J. Terrence McCabe, *Cattle Bring Us to Our Enemies: Turkana Ecology, Politics, and Raiding in a Disequilibrium System* (Ann Arbor, MI: U Michigan P, 2004); Serge A. M. Tournay, 'Generational Systems on the Threshold of the Third Millennium: An Anthropological Perspective', in Eisei Kurimoto and Simon Simonse (eds.) *Conflict, Age, and Power in North East Africa* (Oxford, UK: James Currey, 1998); Yntiso Gebre, 'Environmental Change, Food Crises and Violence in Dassanech, Southern Ethiopia', *Research Report Peace and Conflict Studies No. 1* (Berlin, Germany: Research Unit Peace and Conflict Studies, Freie Universität Berlin, 2012).

¹⁹ Ethiopia Central Statistical Authority (note 10) p. 84.

²⁰ Gebre (note 14) p. 23.

The Gabra live in the most arid parts of north-central Kenya and the adjacent areas of southern Ethiopia. They are internally divided into two major groups, the Malbe and Miigo. The Malbe constituted over 45, 000 people mostly living in the Chalbi desert of Kenya, bordering with the Rendille in the south and Borana in the east.²¹ By contrast, the Miigo numbered only about 20, 000 in late 1990s, and live in Ethiopia, neighboring with the Borana in the east and the Dassanech in the west.²² Both Gabra groups speak a dialect of Oromifa, which is also the language of the Borana, but the Malbe practice a mix of Christianity, Islam, and traditional local religion, while the Miigo are predominantly Muslims.

The Gabra specialize in raising camels.²³ The Malbe largely pursue nomadic pastoralism, while their Ethiopian counterparts are largely sedentary agro-pastoralists.²⁴ Since the Malbe are the larger group, we can consider the Gabra to be largely nomadic pastoralists.

Ethnographers also report that the Ethiopian Gabra continue to have fairly good relations with the Borana, the dominant group in the region. This is reflected in many ways including culturally recognized access to Borana controlled deep water wells and critical dry season grazing reserves.²⁵ By contrast, Gabra-Borana relations in Kenya have reportedly worsened especially beginning in 2005 when a government implemented administrative reform program culminated with the creation of a new predominantly Gabra inhabited district in 2007. Election violence in Ethiopia also spilled across the border. In the summer of 2005, when Gabra crossed the border to register and vote in elections in Ethiopia, Ethiopian Borana retaliated and attacked a Gabra village in Kenya, killing 70 people and stealing livestock.²⁶

Garre

The Garre are a small Somali-speaking group living on the eastern borders of Ethiopia's Borana zone with a substantial extension southward into Kenya. They are referred in the recent literature

²¹ *Kenya Central Bureau of Statistics 2001.*

²² Paolo Tablino, *The Gabra: Camel Nomads of Northern Kenya* (Nairobi, Kenya: Paulines Publications Africa, 1999).

²³ McPeak *et al.* (note 6).

²⁴ *Ibid.*; Lance W. Robinson, 'Participatory Development and the Capacity of Gabra Pastoralist Communities to Influence Resilience' (Ph.D. Dissertation, University of Manitoba, 2009).

²⁵ Tablino (note 18); Toru Suga, 'Sharing System of the "Scarce Resources" in Southern Ethiopia', in Svein Ege, Harald Aspen, Birhanu Teferra and Shiferaw Bekele (eds.) *Proceedings of the 16th International Conference of Ethiopian Studies, Vol. 3* (Trondheim, Norway: Department of Social Anthropology, Norwegian University of Science and Technology, 2009) pp. 357-68.

²⁶ Known as the 'Turbi Massacre,' see Marco Bassi, 'The Politics of Space in Borana Oromo, Ethiopia: Demographics, Elections, Identity and Customary Institutions', *Journal of East African Studies* 4/2 (2010) p. 239.

as *Garre Somali* because of their linguistic affinity and cultural similarity with the dominant Somali people to the east. Yet, previous ethnographers quote Garre informants who claim that they are neither Somali nor Borana.²⁷ As to their subsistence type, many Garre who recently settled in permanent homes in towns (notably Moyale, Mandara and El Wak) are engaged in trade and commercial services. Income from these sources is augmented from crop cultivation along river banks and irrigated plots, together with the fattening of animals for sale.²⁸ Yet, a majority of the Garre outside towns and market centers primarily rely on nomadic herding as they did for generations in the past.

As described above, Borana communities claim that the new Ethiopian administrative map unfairly placed previously Borana controlled wells on the Garre side of the border. This decision has caused a long standing conflict between Garre and Degodia Somalis on one hand and Borana communities on the other.²⁹

Rendille

The Rendille are Cushitic-speaking people whose traditional homeland extends from the slopes of Marsabit Mountain in the east to the shores of Lake Turkana in the west.³⁰ A majority of them currently live in the western half of this territory; other Rendille live in the eastern half which also houses people of Samburu, Ariaal and Garre ethnic backgrounds.³¹

Recent studies show that these two parts of Rendille country differ markedly. As of 2006, the Rendille in the non-mixed core ethnic area of Kargi were clustered in dense, clan-based settlements which were enlarged in the early 1990s to protect against armed raids from

²⁷ For example, see Gunther Schlee, 'Territorializing Ethnicity: The Imposition of a Model Statehood on Pastoralists in Northern Kenya and Southern Ethiopia', *Journal of Ethnic and Racial Studies* 36/5 (2011) pp. 857-74.

²⁸ Getachew Kassa, 'The Displacement and Return of Pastoralists in Southern Ethiopia: A Case Study of the Garri', in Tim Allen (ed.) *Search of Cool Ground: War, Flight and Homecoming in North East Africa* (London, UK: James Currey, 1996).

²⁹ Mohammud Abdulahi, *The Changing Nature of Pastoral Conflicts in South-Eastern Ethiopia: The Case of the Boran and Digodi Pastoralists*, (Addis Ababa, Ethiopia: Africa Peace Forum, Pastoralist Concern Association Ethiopia, InterAfrica Group, Saferworld, 2005); Bassi (note 22).

³⁰ Fratkin and Roth (note 6).

³¹ McPeak *et al.* (note 6).

neighboring Gabra.³² By contrast, Rendille households in the ethnically mixed eastern areas lived in dispersed settlements. Furthermore, the Rendille in the west continued to specialize in camel production which fit well with the areas very dry climate and extensive rangelands. In the relatively moist eastern areas, by contrast, the Rendille earned their living primarily from commercial activities such as retail trade, running drink houses, restaurants and transportation service.³³ Because of the high economic value of camels, the Rendille in the western regions are among the region's wealthiest.³⁴ Key drivers of this change include proximity to the main Nairobi-Moyale road and the Rendille's exceptionally harmonious relations with the culturally related Samburu.

Samburu

With an estimated population of about 100,000 in the late 1990s, the Samburu are Ma-speaking people mostly living in Samburu district of north central Kenya. Their immediate neighbors include Borana, Rendille and Turkana to the north and northwest, Maasai to the south and Pokot to the southwest. Traditional subsistence depended on nomadic herding, supplemented with pockets of rain-fed agriculture. Over the past few decades, however, Samburu herders faced substantial land loss to government funded or approved commercial ranches and wildlife sanctuaries. The Samburu also lost part of their traditional grazing areas along the eastern shores of Lake Turkana to Turkana invaders.³⁵

Samburu sought to make up for the land they lost by seasonally taking their herd to productive rangelands in the neighboring Laikipia district. But this brought them into direct conflict with Pokot herders who were also pushing further east in search of better grazing.³⁶ The Samburu also responded with greater reliance on farming together with livestock herding. Some Samburu households, generally poorer households, make their living with non-pastoral and non-farming commercial activities.

³² H. Jürgen Schwartz, 'Ecological and Economic Consequences of Reduced Mobility in Pastoral Livestock Production Systems', in Roth and Fratkin (note 6) pp. 69-86.

³³ Elliot Fratkin and Kevin Smith, 'Women's Changing Economic Roles with Pastoral Sedentarization: Varying Strategies in Alternate Rendille Communities', *Human Ecology* 23/ 4 (1995) pp. 433-54.

³⁴ McPeak *et al.* (note 6).

³⁵ *Ibid.*

³⁶ *Ibid.*

The Samburu have peaceful and extensive economic ties with the neighboring Rendille peoples. The latter is reflected in long-standing relations of intermarriage, pasture sharing, livestock exchange among households from both ethnic groups.³⁷

Turkana

The Turkana are a Nilotic-speaking people living in northwestern Kenya who earn their living largely by raising five types of animal species -- cattle, camels, goats, sheep, and donkeys. The Turkana are one of the few remaining pastoral groups who continue to pursue a primarily nomadic life moving seasonally over expansive rangelands in search of better pasture and water for animals. In normal years, most households live and travel together with two to five closely related households, forming a joint herding unit, or large household. During the wet season, when pasture is abundant for larger herds, many homesteads congregate into temporary village-like groupings. With the onset of dry season, however, this group has to break up into smaller units to adapt to scarce pasture and water. The group gets even much smaller during droughts when animals are divided into species-specific smaller herds. While adaptive to future herd survival, this last strategy has the disadvantage of exposing the herd to raiders from hostile neighbors. One of the responses to this challenge has been the emergence of a defensive social organization called Arum-Rum. This new organization, which was promoted after intensive Pokot raids in the 1990s, consisted of about fifty or more families, which previously migrated in small independent groups, living and moving together under the leadership of a single leader.³⁸ While greatly enhancing the odds of herd survival, accessing drought reserves brings the Turkana in closer proximity to the neighboring Pokot, Karamajong, Samburu, Nyangatom and Dassanech peoples. Turkana relations with these groups has, for the most part, included numerous episodes of livestock raiding and counter raiding.³⁹

Livestock versus Cultivation

We wanted to contrast the ethnic groups by degree of dependence on livestock versus cultivation. The ethnic groups that have the majority of people earning their living primarily from pastoral activities (including both cash income from livestock sales and livestock products, notably milk, meat and blood, for home consumption) are the Turkana, Gabra, Rendille and Garre (excluding residents of Moyale, Mandara and El Wak town centers). Ethnographic accounts of these peoples report no or very little farming and they also show that herding units have been relatively

³⁷ Elliot Fratkin, *Ariial Pastoralists of Kenya: Studying Pastoralism, Drought, and Development in Africa's Arid Land* (Boston, MA: Pearson, 2004).

³⁸ McCabe (note 14) p. 231.

³⁹ Ibid.; Michael Bollig, 'Ethnic Conflicts in North-West Kenya: Pokot -Turkana Raiding 1969-1984', *Zeitschrift für Ethnologie* 115 (1990) pp. 73-90; Sandra Gray, Mary Sundal, Brandi Wiebusch, Michael A. Little, Paul W. Leslie and Ivy L. Pike, 'Cattle Raiding, Cultural Survival, and Adaptability of East African Pastoralists', *Current Anthropology* 44 (2003):1-28.

less affected by land loss to non-pastoral uses. This has allowed continuity of long established day-to-day and season-to-season mobility patterns to the present.

A second subsistence category includes ethnic groups where the lion's share of household income comes from a combination of herding and cultivation. We call this group *agro-pastoralists* and include the Dassanech and Samburu (excluding laborers working for commercial farms and poor traders and displaced aid recipients residing in towns and relief distribution sites.) Because the Dassanech have had important agricultural zones along riverine areas for a long time, we consider them to have more important agriculture than the Samburu. Both groups have encountered substantial land loss to commercial and private uses, constraining them from pursuing long-distance seasonal migrations of the kind practiced by nomadic pastoralists. However, these communities have better access to markets because of geographical proximity to major roads and trading routes. These changes have led some household to rely primarily on non-pastoral and off-farm activities.⁴⁰

Finally, the third category includes settled farmers who rely primarily on the cultivation of crops and some market vegetables. This group consists of Borana communities, primarily living along Marsabit Mountain (Kenya) and the Borana plateau (Ethiopia). Households in this group were also former agro-pastoralist and/or nomadic pastoralists who were forced to settled down as they lost former rangelands to government projects and expanding plow-based, smallholder, rain-fed farming of the kind widely practiced in Ethiopia. Proximity to paved roads and larger market towns created better opportunities for earning cash. Some of the households in this group maintain herds in satellite camps but income from this sector has greatly declined.⁴¹

Ranking the ethnic groups from more pastoral to more agricultural gives us the following order: Turkana, Gabra, Rendille and Garre, Samburu, Dassanech, and Borana.

METHODS

Our data for the comparisons we present here come largely from two sources: 1) the ACLED database, supplemented by our own review of newspaper reports from *LexisNexis Academic* to clarify the ethnic groups involved, to check for duplicates, and to codify whether the violence

⁴⁰ McPeak *et al.* (note 6).

⁴¹ *Ibid.*, 96.

event was ‘livestock-related’; and 2) meteorological data on 0.25 square degree (approximately 30 square kilometers) quadrants by month and year from 1998-2009.⁴²

Rainfall

To measure rainfall, we plotted a grid of 345 quadrants measuring .25x.25 decimal degrees (~30km x 30km), each containing monthly rainfall data for 1998-2009 from NASA global precipitation records.⁴³ These data were assigned in monthly increments to each of the 345 quadrants. Thus, for the 12 years of coverage, there were 144 months or 144 data points for each quadrant. We averaged all the months in each year to arrive at a yearly average for any cluster of quadrants assigned to a specific ethnic group. We also calculated average monthly (e.g., January, February) rainfall for each ethnic group based on the quadrants in which they resided. Quadrants were assigned to ethnic groups according to the ethnic composition of administrative district and sub-district units as derived from government and ethnographic reports.⁴⁴ By and large ethnic boundaries conformed to administrative boundaries.⁴⁵ However, if more than one ethnic group resided in a territorial unit, the rainfall data for each ethnic group was weighted according to the approximate percentage of population of that ethnic group residing in the territorial unit. For our analyses we transformed rainfall for each ethnic group into standardized z-scores.

Livestock-Related Violence

⁴² Clionadh Raleigh, Andrew Linke, Håvard Hegre and Joakim Karlsen, ‘Introducing ACLED: An Armed Conflict Location and Event Dataset: Special Data Feature’, *Journal of Peace Research* 47 (2010):1-10; see also Clionadh Raleigh, Andrew Linke and Caitriona Dowd, *Armed Conflict Location and Event Dataset (ACLED) Codebook Version 2, Released 2012*, online at www.acleddata.com/wp-content/uploads/2012/ACLED_Codebook_2012.pdf, accessed 11 April 2013; LexisNexis Academic can be found at <http://www.lexisnexis.com/hottopics/lnacademic/>

⁴³ <http://precip.gsfc.nasa.gov/>

⁴⁴ Assessment and Consolidation Report on Existing Approaches and Best Practices in Cross Border Peace Building and Conflict Mitigation and Strengthened CSOs Across the Ethio-Kenya Border (Addis Ababa, Ethiopia: Integrated Agriculture Development Consult, 2009); CEWARN Baseline Study for the Ethiopian-Side of the Somali Cluster (Addis Ababa, Ethiopia: The Conflict Early Warning and Response Mechanism, 2006); CEWARN Baseline Study for the Kenyan-Side of the Somali Cluster (Addis Ababa, Ethiopia: The Conflict Early Warning and Response Mechanism, 2006); McPeak et al. (note 6); Schlee (note 23).

⁴⁵ Schlee (note 23).

In this study we focus explicitly on the intensity of livestock-related violence by year and month, as did Witsenburg and Adano, and Ember *et al.*⁴⁶ Following Ember *et al.*, we define livestock-related violence as raids which are socially organized, at least on one side, and involve one or more of the following: an attempt or actual theft of livestock, disputes over access to water or pasture for livestock, or retributions for previous livestock raids. We agree with Witsenburg and Adano that intensity of violent conflict measured in number of fatalities is a better measure than number of violent incidents, so we use fatalities here.

We decided to use the Armed Conflict Location and Event Dataset (ACLED) as a starting point because it mostly satisfied our requirements for information on type, date and location of conflict; ethnic group involved; and fatalities. ACLED defines a conflict event as an interaction between designated actors at a specific point location on a specific day. The actors identified in ACLED include governments, rebels, militias, ethnic groups, active political organizations and civilians.

ACLED covers all political violence from civil war to demonstrations and riots. For our purposes we had to select from ACLED data specific to livestock-related violence involving the seven ethnic groups. Furthermore, to match our rainfall data we selected conflict events occurring only in the years 1998-2009. A series of steps were performed to gather and tabulate this data.

1) Our first step was to use ACLED information from several columns to pull out potential conflicts involving each of the seven ethnic groups--Borana, Dassanech, Samburu, Garre, Rendille, Gabra, and Turkana. ACLED distinguishes between aggressors ('Actor 1' and 'Ally Actor 1') and victims ('Actor 2' and 'Ally Actor 2.'). There is also information regarding actors in the Notes column. After importing the ACLED data from Africa for the years 1998-2009 into a relational database, we queried the contents for whether the name of each ethnic group (or its variant names or spellings) appeared in one of the five columns (Actor 1, Ally Actor 1, Actor 2, and Ally Actor 1, and Notes). All events possibly relating to one group (e.g., Samburu) were put together in a database file with that ethnic group name. If an actor was identified as 'unknown' in ACLED, but the origin place of the actor is given in the Notes section, then we assigned it an ethnic designation if the region was relatively homogeneous. For example, an 'unknown ethnic militia' originating from Samburu District was assigned to the Samburu ethnic group. If we were in doubt as to the ethnic group because the region was heterogeneous, we left the event out. Although the Rendille are a major ethnic group living in western Marsabit District along the east coast of Lake Turkana, there were no ACLED conflict events in the time period that included them. An additional review of *LexisNexis Academic* news reports found only two violent attacks on the Rendille, in January of 2001 and 2005, involving a total of eight fatalities. While it is possible that there were few livestock-related events involving Rendille, we assume that events are underreported, so we omitted Rendille from our analyses.

⁴⁶ Witsenburg and Adano (note 1); Ember *et al.* (note 3).

2) We next tagged all conflicts that were livestock-related incidents. If no information about livestock was in the ACLED notes, then we referred to the original news reports using LexisNexis to find information that would enable us to assess whether the event fit the definition of livestock-related violence.

3) The particular way ACLED defines a conflict event and how it estimates dates and fatalities required some adjustment of the data on our part. ACLED defines a conflict event as an incident involving designated actors at a specific location and on a specific day. Conflicts that occurred over several days or across an expanse of territory, which is not uncommon when herders retaliate and pursue an enemy to a location different than the original attack—could be counted multiple times in ACLED. Also, if news accounts varied in their precision of the location of a conflict, some reporting a town, whereas others a division, then it could also appear as separate events in ACLED. Furthermore, if news sources identified different combinations of actors then the event might show up multiple times as separate conflict events in ACLED. Because we are focusing on ethnic-based livestock-related violence, our definition of a conflict event could occur over several days and across a region. Therefore we had to cull from ACLED multiple records of the same event as we defined it.

4) In addition to tagging whether an event was livestock-related or not, we also wanted to know whether the ethnic group was judged to be an attacker in the event or was attacked. Most of our analyses were made with the ethnic group as the attacker or allied attacker because we were interested in ethnic group differences; we assumed that the decision to attack should be under the control of the attacker.

5) To examine aggregated results, we eliminated duplicates in which two or more ethnic groups in the sample were involved in the same conflict.

6) Because our study focuses on monthly and yearly patterns of violence, it was important to verify the correct month of conflict events that ACLED assigned a time precision of ‘2,’ meaning that only the week is known. Accordingly, all ACLED livestock-related events with a time precision of ‘2’ were cross-checked with the original news reports in LexisNexis. Of the 32 events that were dated in the first or last week of the month for the Marsabit ethnic groups, all but one was assigned the correct month. Only one conflict was recorded in the previous month, accordingly we reassigned it to what we believed to be the correct month.

7) It is the practice of ACLED coders to divide the total fatalities among multiple listings of an event. For example, a two-day clash involving the Oromo Liberation Front (OLF), Degodia Somali, and Borana was recorded as eleven separate events in ACLED. The newspaper reports listed ‘at least 142 people killed,’ although some eye witnesses reported up to 300 killed.⁴⁷ We revised this 11-conflict event series to one conflict between Borana and Degodia with 281 total fatalities—by far, the most deadly event in the time period analyzed. However, the number of events was not important to us, so this revision was largely inconsequential.

⁴⁷ David Orr, ‘Toll of 300 Feared in Kenyan Attack’, *The Scotsman*, 3 November 1998.

8) We performed one final check to assure ourselves that the fatality figures in ACLED, only introduced in 2012, were reasonably accurate. We wanted both to respect the integrity of the database and yet assure ourselves that we would be able to rely on ACLED fatality figures for this and future studies. Looking just at livestock-related violence, we compared ACLED's fatality figures for Turkana with figures from Ember *et al.*, derived from LexisNexis.⁴⁸ Although the fatality figures in Ember *et al.* were in general higher, we found the pattern of fatalities by year and month in that study congruent with the ACLED pattern for the same group and so were confident in going ahead and using ACLED data.

9) Because some of our analyses involved putting data together across groups, it was necessary to put livestock raiding on the same scale for each group. Since we believe that less important raids were probably underreported, we decided to use rank scores rather than absolute scores for fatalities. Accordingly, we created a rank of attacking fatalities for livestock-related violence for each group (the lowest number of fatalities have the lowest rank; ties are averaged.) For some analyses we also transformed these ranks into z-scores. We calculated rank scores for each year (1998-2009) and by month across years.

Livestock-related Conflict Events Summary

Altogether there were 201 livestock related conflict events in ACLED for the Marsabit ethnic groups between 1998 and 2009 that had livestock-related conflict events. We revised this number to a total of 109 events, according to our definition of an event. The total fatalities remained the same, 1533. Borana fatalities were almost half the total for all the groups, a fact which will be important for understanding the aggregated results.

RESULTS

Disaggregating Ethnicity

Ember *et al.* suggested that the difference between their results regarding the Turkana and the Witsenburg and Adano results may have been due to differences between the more pastoral Turkana and more agricultural groups residing in Marsabit.⁴⁹ Witsenburg and Adano also aggregated fatalities from both attacked and attacking raids.⁵⁰ In our view, this latter aggregation is also unfortunate because most of the fatalities could be due to groups outside the Marsabit area attacking groups within Marsabit. If we want to understand behavior of different ethnic groups, we believe it is best to concentrate on attacking raids conducted by each ethnic group.

⁴⁸ Ember *et al.* (note 3) p. 169.

⁴⁹ Ember *et al.* (note 3) pp. 177-78;

⁵⁰ Witsenburg and Adano (note 1).

However, in order to examine the idea that Witsenburg and Adano's aggregation might have obscured ethnic differences, we needed to follow their methods as closely as possible. Therefore we examined individual ethnic group patterns combining attacking and attacked fatalities as distributed over months and years. In examining these individual ethnic group graphs (not shown), it seemed that only the Borana, the most agricultural of the groups, appeared to have a pattern consistent with the Witsenburg and Adano claim that more intense raids occur largely in the wet seasons.⁵¹ However, in large part, the other groups in Marsabit do not have that pattern. Therefore we contrast the combined attacking and attacked fatalities involving the Borana with the aggregated non-Borana Marsabit groups. Figure 1 shows the comparison of monthly patterns.

FIGURE 1

MONTHLY ATTACKING AND ATTACKED FATALITIES INVOLVING BORANA AND
NON-BORANA ETHNIC GROUPS FOR YEARS 1998-2009

With the exceptions of January to March and July, the Borana and the non-Borana graphs look quite different. Two of the three highest Borana peaks in livestock-related violence are in the rainy months of May and October. In contrast, all three of the non-Borana peaks are in dry months (July, February, September). Figure 2 compares the same Borana graph (dotted line) with an aggregated sum of all the fatalities involving the ethnic groups in Marsabit. Note that the graphs look almost identical. Although our time frames and data sources are different, our result is consistent with the Ember *et al.* idea that the Witsenburg and Adano method of aggregation obscured ethnic differences. The aggregated monthly pattern mostly fits the Borana pattern. The probable reason is that the Borana accounted for about half of the total fatalities.

FIGURE 2

MONTHLY ATTACKING AND ATTACKED FATALITIES INVOLVING BORANA AND ALL
MARSABIT ETHNIC GROUPS INCLUDING BORANA FOR YEARS 1998-2009

If we now look at the yearly patterns (Figure 3), a similar pattern of difference appears between Borana and the other groups. None of the Borana peaks (1998, 2006, 2001) were in very dry years; in fact 2006 was the wettest year for the Borana. In contrast, the highest non-Borana peak was in 2000, the driest year of 12 and the other two smaller peaks, 2008 and 2005, were below average for Marsabit. With one exception, the graph comparing Borana and aggregated yearly totals (Figure 4) look almost identical. That exception is that the Borana graph has a small peak

⁵¹ *Ibid.*

in 2001, a year slightly below average in rainfall, while the overall graph peaks in 2000, an exceptionally dry year.

FIGURE 3

ATTACKING AND ATTACKED FATALITIES BY YEAR INVOLVING BORANA AND NON-BORANA MARSABIT ETHNIC GROUPS FOR YEARS 1998-2009

FIGURE 4

ATTACKING AND ATTACKED FATALITIES BY YEAR INVOLVING BORANA AND ALL MARSABIT ETHNIC GROUPS INCLUDING BORANA FOR YEARS 1998-2009

Looking at Ethnic Groups Individually

As discussed above, we believe it is best to concentrate on attacking fatalities if we want to better understand the behavior of different ethnic groups. Figure 5 compares the monthly graphs of fatalities in attacks by each of the five Marsabit groups with some fatalities. Turkana is shown for comparison. Figure 6 compares the yearly graphs. In both figures and in the following tables, the societies are ordered by most agricultural to least (Borana to Turkana) as discussed above. Note that the first rainy season of the year is April and May and the second rainy season is October and November. The Dassanech appear to have their second rains go into December as well.

FIGURE 5

MONTHLY ATTACKING FATALITIES ACROSS 12 YEARS, 1998-2009

At first glance, the monthly graphs for the different ethnic groups each seem quite different from each other. But if we look at the prominent peaks, only the Borana have most of their peaks (2 of 3) in the rainy seasons. The Samburu have the second highest peak in rainy April, but the higher peak is in February, the driest month; minor peaks are in dry months as well. The Gabra have the highest peak in rainy May, but the other two peaks are in their two driest months, February and July. All the other groups have their major peaks only in dry months.

Column 1 of Table 1 shows the correlations between the ranks of attacking livestock-related fatalities by month with the *z-score* of monthly rain (monthly totals across the 12 years) for each ethnic group. We have also added correlations with ‘very dry months’ (months with ≤ -1 *standard deviation* below normal--see column 2) and with wet months (> 0.5 *standard deviation*)

TABLE 1

BIVARIATE CORRELATIONS (SPEARMAN'S RHOS) WITH RANK OF ATTACKING LIVESTOCK-RELATED FATALITIES BY MONTH FOR EACH ETHNIC GROUP

Although none of the correlations are significant for the Borana, the direction of the correlations are consistent with their having more livestock-related violence in wet rather than dry months. None of the other groups show such high positive correlations in column 1. As for the Ember *et al.* suggestion that the more pastoral groups would have the greatest tendency for more violence to be in drier months, we do not see a clear trend downwards in the table since the Dassanech, the second most agricultural group, shows the strongest opposite relationship between attacking fatalities and rain--more violence in drier months. However, the more agricultural Borana stand out from all the other groups. It is somewhat surprising that the Turkana do not show any strong relationships between dry months and more violence since the Ember *et al.* paper showed that quite clearly. However, the ACLED database contained fewer incidents (n=14) than those reported by Ember *et al.* (n=26).

FIGURE 6

TOTAL YEARLY ATTACKING FATALITIES, 1998-2009

Turning to the yearly graphs (Figure 6), the driest year for all groups was 2000. All groups but Borana and Gabra have peaks in fatalities during that year. The Garre, in contrast to the other Marsabit groups, had a very dry year in 2005 (their second driest) and both peaks are in their two driest years. The Samburu and the Turkana both also have peaks in 2008 (the 4th and 3rd driest for the Samburu and Turkana respectively). Dassanech have three peaks and only one (2000) is in a drought year. Finally, the Borana have both peaks in wet years 1998 and 2006. The Gabra have their highest peak in an average rainfall year (2007) and minor peaks in about average and slightly below average rain years (2004-5). Overall, the Borana mostly fit the wet year pattern, the Dassanech are next, followed by the Gabra whose peaks are average rain times; the remaining groups follow a drier pattern for violence. Thus, except for the Gabra, the more pastoral groups appear to have more violence in drier years as Ember *et al.* suggested.

The differences in the yearly patterns become more evident if we correlate the rank of livestock related attacking fatalities with the *z-score* of rain for each group. Notice that in column 1, except

for the Gabra, the *rhos* roughly go from positive to negative. With regard to extremely dry years, only the Borana and Gabra have lower fatalities in extremely dry years. The relationship between extreme dryness and more fatalities is marginally significant for both Dassanech and Turkana. Only the Borana have a significant relationship between attacking fatalities and very wet years.

TABLE 2

BIVARIATE CORRELATIONS (SPEARMAN'S RHOS) WITH RANK OF ATTACKING LIVESTOCK-RELATED FATALITIES BY YEAR FOR EACH ETHNIC GROUP

Combining Patterns across Ethnic Groups

The sample size for each correlation in Tables 1 and 2 is quite small--all have an *n* of 12--twelve months or twelve years. We wanted a method of aggregation that did not favor the Borana or any other ethnic group with higher fatalities, so we decided to create normalized or *z-scores* for the ranks of livestock-related violence for each group before aggregating. (We did not base *z-scores* on the actual number of reported fatalities because we were not comfortable that the actual number was precisely known or reported; we did not create *z-scores* across the ethnic groups since the means for each group are considerably different.) The aggregation including Turkana gives us a total of 72 cases (12 months for each of 6 groups or 12 years for each of 6 groups). Figure 7 shows the aggregated monthly pattern. Note that the three highest bars (the most violence) are in dry months (January, February, and July), the fourth and fifth highest bars are in the first rainy season (May and April). But the other dry months (June through September) show diverse patterns in violence and the second rainy season (October through November) is below average in violence. This mixed pattern may account for why 'dryness' or 'wetness' are not that strongly correlated with violence. If we remove Borana, as shown in Figure 8, the slight uptick in violence in the first rainy season disappears, suggesting that the Borana mostly account for that pattern.

Note that in both figures (7 and 8) two of the dry months (June and December) appear to have less violence. We speculate that for groups relying on agriculture, June and December are likely harvest months, which means that food supplies should be ample. (Alternatively the need for labor during harvest might make raiding unlikely.) For the more pastoral groups, the time just after the rains are unlikely to have much scarcity since animals will be well-fed and well-watered after the rains. One other point to note is that Figure 7 suggests that the second rainy season (October and November) has below average violence.

FIGURE 7

AVERAGE STANDARDIZED RANK SCORES OF LIVESTOCK-RELATED VIOLENCE
BY MONTH ACROSS ALL ETHNIC GROUPS

FIGURE 8

AVERAGE STANDARDIZED RANK SCORES OF LIVESTOCK-RELATED VIOLENCE
BY MONTH ACROSS ALL ETHNIC GROUPS EXCEPT BORANA

Because the category of month seems important, not just whether it is wet or dry, we divided the months by the following categories: 1) Dry Month that doesn't fall into other categories--Jan, Feb, July-September); 2) First Rainy Season--April and May; 3) Second Rainy Season--October and November; 4) Month after Rain--June, December; and 5) Month before First Rain--March. Figures 9 shows the standardized rank scores of livestock-related violence by category of month for all the groups. Figure 10 omits the Borana,

FIGURE 9

AVERAGE STANDARDIZED RANK SCORES OF LIVESTOCK-RELATED VIOLENCE
BY CATEGORY OF MONTH ACROSS ALL ETHNIC GROUPS

FIGURE 10

AVERAGE STANDARDIZED RANK SCORES OF LIVESTOCK-RELATED VIOLENCE
BY CATEGORY OF MONTH ACROSS ALL ETHNIC GROUPS EXCEPT BORANA

We performed some exploratory multiple regression analyses on the combined data. We wanted to stay with theoretically important variables, so we wanted a measure of 'rain' and 'dry'. However, the graphic data presented above suggest that only the main rainy season may have an effect on increasing violence, so we used a categorical variable 'main rainy season' for April and May. For 'dryness' we categorized the months more than .5 standard deviations below normal for each as 'dry'. We added one new variable, not previously theorized, 'month after rain' (June and December). The multiple R (Table 3) is marginally significant ($R=.33$, $p = .052$). The effect of the main rainy season is not significant (standardized beta = .13), being a dry month is marginally significant (std. beta = .21, $p=.09$, two tails), and the new concept, 'month after rain' is significant (std. beta = -.25, $p = .04$, two tails). If we leave out the Borana (not shown), the

result does not substantially change except that the *standardized beta* for the main rainy season approaches zero.

TABLE 3

MULTIPLE REGRESSION PREDICTING MONTHLY LIVESTOCK-RELATED FATALITIES
(Z-SCORES OF RANKS)

Overall, there is little support for the importance of 'wetness' in predicting livestock-related violence for the combined six ethnic groups when they are equally weighted. 'Dryness' is a somewhat better predictor, although the months after rains (also dry months) appear to work in the opposite direction.

Yearly Combined Patterns

Figure 11 shows the mean standardized ranks of livestock-related violence by category of standard deviation above and below the average yearly rainfall. Note that we used the *z-scores* for each group calculated separately. The only categories that show above average violence are the extremes--the very dry years where the *z-score* is -2 or less and the wetter years where the *z-score* is greater than 1. However, the bar graph is much higher for the extremely dry year, suggesting that dryness is more strongly related. Since we know that the Borana and the Gabra were the only ethnic groups to have positive correlations between livestock fatalities and rainfall, we redid the graph omitting both groups as shown in Figure 12. The bar with the most extreme wet years is now much lower in fatalities and the slightly drier years (-.99 to -.49) is now above average.

FIGURE 11

AVERAGE STANDARDIZED RANK SCORES OF LIVESTOCK-RELATED VIOLENCE
BY CATEGORY OF STANDARD DEVIATION IN YEARLY RAINFALL ACROSS ALL
ETHNIC GROUPS

FIGURE 12

AVERAGE STANDARDIZED RANK SCORES OF LIVESTOCK-RELATED VIOLENCE
BY CATEGORY OF STANDARD DEVIATION IN YEARLY RAINFALL ACROSS
ETHNIC GROUPS EXCEPT BORANA AND GABRA

Although the graphic representations suggest that extremely dry years are more predictive of violence than extremely wet years, we created a dichotomous variable for the extremes and also put in the z-scores for rain. However, since there was only one extreme dry year (2000), and not all the ethnic groups had as extreme drought in that year, we changed the category to less than or equal to -1.5 standard deviation. Similarly, there were not enough cases with extreme wet years, so we made that category >1.25 standard deviations. The multiple regression (see Table 4) was significant ($R=.33$, $p=.045$), but the only significant variable was extremely dry year (std. beta=.36, $p=.03$, $n=72$). The overall model was also significant omitting Borana and Gabra (see column 2 of Table 4), but 'very dry' is only marginally significant.

TABLE 4

MULTIPLE REGRESSION PREDICTING YEARLY LIVESTOCK-RELATED
FATALITIES (Z-SCORES OF RANKS)

DISCUSSION AND CONCLUSIONS

Our main purpose was to see if the Witsenburg and Adano conclusion that livestock-related raids occurred mostly in wet times generalized across the different ethnic groups residing in Marsabit District. Although our yearly focus differed from theirs and our data collection focused on ethnic groups, rather than Marsabit District *per se*, we found support for the Ember *et al.* contention that aggregation by Witsenburg and Adano probably obscured underlying ethnic group differences. Indeed, it is largely only the most agricultural group--the Borana--that fits the Witsenburg and Adano pattern. But the Borana have the largest number of fatalities. So it is not surprising that when we add all the data up, the aggregate pattern looks like the Borana pattern. But when we contrast the Borana and non-Borana, the patterns look considerably different. If anything, there is stronger support for more violence in dry times.

Ember *et al.* also suggested that the degree of dependence upon pastoralism versus agriculture could account for ethnic group differences. We did not find a clear trend in this direction for monthly violence, but except for the Gabra, the yearly pattern appears to fit this expectation--as you move to more pastoralism, the correlations between rain and raids turn from positive to negative. If there is a pattern, why should the Gabra be exceptional? As we discussed above, the Ethiopian Gabra benefitted from well established water sharing arrangements with the Borana,

providing labor in exchange for access to water. So in the dry season the Gabra, unlike the other pastoralists are not heading for more risky environments. Also, the Gabra peak in attacking violence in 2007, a wet year, probably was largely political due to worsening Gabra-Borana relations in Kenya with the creation of a new predominantly Gabra administrative district in 2007.

But Ember *et al.* raise an interesting question--namely, is wet season livestock-related violence for some groups such as the Borana related to 'plenty'? Or, is it more accurately described as a 'scarce' time?

It is widely known that agriculturalists commonly have 'hungry seasons' particularly before the first planting of the agricultural cycle.⁵² Such seasons coincide with the main planting and growing season because crops will not be harvested for months and granaries may be nearly empty. When temperatures are moderate throughout the year and agriculture is rain-fed, the availability of water is the main constraint for the ability to farm. Hence, the rainy season, particularly the main rainy season, and scarce times usually coincide. In contrast, for pastoralists, the rainy season, as Witsenburg and Adano point out, is a time of plenty. There is ample pasture, other vegetation, and water for animals.

But what if the economy is a mixed one? If there is little pasture near the main settlements, animals may have to be pastured at considerable distances where they will not help with the food supply. We know that many agro-pastoralists encounter dramatic seasonal swings in the availability of milk at main settlement/base camps when the animals are far away.⁵³ Nutritional surveys in eastern Africa suggest that the more sedentary groups in this region are often poorer than the more nomadic groups, because pastoralists can adapt to spatial and temporal variations in rainfall and pasture conditions by moving.⁵⁴ Although we do not have direct evidence that the rainy season is a scarce time for the more agricultural Borana, it is certainly a possibility.

While the overall trend in our findings appear most compatible with the idea that livestock-related violence is generally higher during 'dry' times (albeit with the Borana being a major exception), along the way we have uncovered some factors that might add more nuance to this picture. In particular, with respect to monthly variation, it appears necessary to consider that not all dry months or wet months are equal. First, the first rainy season and the second rainy season look different with regard to violence. Second, the dry months following the rains are significantly lower in violence.

⁵² Parker Shipton, 'African Famines and Food Security: Anthropological Perspectives', *Annual Review of Anthropology* 19 (1990) pp. 353-94; Robert Chambers, *Revolutions in Development Inquiry* (London, UK: Earthscan, 2008).

⁵³ McPeak *et al.* (note 6) p. 27.

⁵⁴ *Ibid.*

We suggest that both patterns are compatible with the scarcity hypothesis if you consider both agriculture and pastoralism together. The first rainy season of the year is usually the main planting season for those relying on agriculture. Stored food will probably last through the second planting season, if there is one. So only the first rainy season might be a scarce time. As we suggested above, the dry month after the rains—a low violence time—are probably harvest months when food should be plentiful. Even if people rely mostly on pastoralism, the animals will be well-pastured and well-watered after the rainy period. It is only when the new year is beginning that scarcity gets to be more intense. Stored crops are running low and the animals have to be gotten to places with more pasture and water. This scenario is consistent with Figures 7 and 8 that indicate that violence peaks at the beginning of the year.

What about the yearly patterns? Our analyses suggest that degree of dryness or wetness *per se* is not as important as having an extremely dry year. After all, most agro-pastoral groups have adapted to vagaries in the weather and have contingency plans. But it is in exceptional times, such as the drought of 2000, that more risks are taken to either get animals to far-away pastures or to take animals from others when yours have died. In our exploratory multiple regressions, the z-scores of rainfall did not significantly affect livestock-related violence, but extreme dryness did. We suggest that it is the unpredictable drought that creates the most stress, not the small vagaries from year to year. This is consistent with the Ember et al finding from an eastern African regional comparison that unpredictable disasters, such as drought that seriously destroys food supplies, trumps chronic shortages in predicting warfare (not just livestock-raiding).⁵⁵

In short, our results suggest that 'wetness' and 'dryness' are too imprecise as measures of plenty or scarcity. Different ethnic groups have different subsistence patterns, labor requirements, storage patterns, and contingency plans. Taking these into account along with more direct measures of scarcity might help untangle what otherwise looks like contradictory evidence.

ACKNOWLEDGEMENTS

⁵⁵ Carol R. Ember, Teferi Abate Adem, and Ian Skoggard, 'Risk, Uncertainty, and Violence in Eastern Africa: A Regional Comparison', *Human Nature* 24/1 (2013) pp.33-58.