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Inequality and ethnic conflict in Sub-Saharan Africa

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Abstract

Theories of ethnic conflict predict that between-group inequality should be associated with a greater likelihood of violent conflict, but empirical results have been mixed. One reason might be that different types of inequality have opposing effects on the likelihood of conflict. In this article, we posit that educational inequalities are likely to incentivize collective action by inducing grievances, while economic and demographic inequalities may actually dis-incentivize collective action by limiting opportunities for disadvantaged groups to engage in rebellion. We test these hypotheses on a new ethnic dyad database, incorporating 1,548 dyads formed by 285 ethnic groups living in 29 sub-Saharan African countries. The analysis reveals that educational inequalities are indeed positively associated with conflict incidence, whilst economic and demographic inequalities are negatively associated with conflict incidence. Interaction analysis provides additional context. The negative association between educational inequality and conflict risk are stronger if groups are wealthier; higher education levels are especially conflict reducing in more autocratic regimes; and a higher level of democracy has a pacifying effect on urbanized or unequally sized groups. These findings demonstrate that to better understand their relationship to conflict, it is important to disaggregate the effects of inequalities according to the underlying mechanisms and political context with which they are associated.

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Introduction

It is well established that inequalities between different ethnic groups can sometime result in tensions between the groups, particularly when ethnic groups have to compete for resources and endowments (Bollig 1993), when social identities overlap with major political or economic grievances (Gurr 1993), or when inequalities exist between the groups (Stewart 2005). More recently, however, scholars have noted that different types of inequalities may have diverging effects on conflict incidence with some inequalities even decreasing the likelihood of conflict (e.g. Østby 2008; Besançon 2005). Although this possibility is widely acknowledged, thus far most research only looks at national-level variables or at the largest ethnic groups in a country, instead of studying all relevant ethnic group combinations. As a result, we still lack clarity on how different types of inequalities affect the likelihood of conflict between ethnic groups.

This paper contributes to the field by using a new dataset to test the impact of three different types of inequality — educational, economic, and demographic inequality — on ethnic conflict. We argue that educational inequalities between ethnic groups should be positively correlated with conflict risk, while economic and demographic inequalities should be negatively correlated with conflict risk. This is because educational inequalities are expected to increase motivations to engage in conflict by fostering grievances amongst groups. On the other hand, economic and demographic inequalities may actually dis-incentivize conflict by limiting opportunities for rebellion.

Our research improves over earlier studies of ethnic conflict by using a much more comprehensive database. Rather than using national-level data, or focusing only on the largest ethnic group[s] within a country, we examine the differences between all combinations of ethnic groups in 29 Sub-Saharan Africa countries. By bringing together data on 285 ethnic groups across these 29 countries, we have constructed a database containing information on 1,548 within-country pairs of groups (referred to as “ethnic dyads” henceforth). This database allows us to obtain a much more detailed picture of the associations between intergroup inequalities and ethnic conflict than has been possible in earlier research. We draw on this dataset to address the following research question:

To what extent and in which way do educational, economic and demographic inequalities between ethnic groups influence the risk of conflict incidence between the groups?

Our findings support the argument that different types of inequalities can have different impacts on the probability of conflict incidence, suggesting that the relationship between inequalities and the occurrence of violent conflict is more complicated than is often suggested.

The paper proceeds as follows. First, we discuss how the relationship between inequalities and conflict has been analysed in the past. Second, we tie group inequality back to the debate between motivations and opportunities, and formulate hypotheses about the effects of different types of inequality on conflict. Third, we discuss the data and the methods used in this research. Fourth, we provide the results of the empirical analysis. Fifth, we discuss the relevance of these findings to the academic debate on inequality and conflict. Finally, we outline the implications of our results and offer concluding remarks.

Vertical versus horizontal inequalities

Communities in less-developed countries are often deprived of rights and services due to a lack of state resources and/or capacity (Besley and Persson 2010). This may develop into feelings of injustice, or grievances, particularly if the allocation of resources and services are unfairly distributed between communities (Horowitz 1985). Inequalities can strengthen the extent of injustice and lead to competition for scarce resources, which could eventually result in violence (Bollig 1993). The traditional method to measure relative deprivation and its impact on conflict incidence was to investigate *vertical inequalities*; that is, to observe inequalities between individuals within a population using national-level data. However, the link between vertical inequality and conflict between groups was difficult to establish empirically. Gurr (2000) claimed the relationship between relative deprivation and conflict was positive, whereas others determined the relationship to be less significant than other factors (i.e., Collier and Hoeffler 2004; Blattman and Miguel 2010). Still, others found a negative correlation between vertical inequality and ethnic war (Besançon 2005).

One of the reasons why scholars likely had difficulties finding a link between vertical inequalities and conflict was that they were using national-level data. However, causal factors that provide intuitive explanations for conflict, such as inequality and discrimination between groups, tend to vary within countries. As a result, their impact cannot be accurately captured with national-level data (Cramer 2003; Buhaug et al. 2011). This has led to a movement by scholars to disaggregate the study of civil war and to focus on systemic inequalities between culturally-formed ethnic groups; i.e., *horizontal inequalities* (Stewart 2005).

In order for horizontal inequalities to become a basis of discontent and antipathy, group identity has to be socially significant to its members. Members have to feel attached enough to the group to identify with other members who feel aggrieved, and to aggregate their experience to a collective injustice. Group members therefore must share some identifiable attributes that are stable over time and are perceived to notably influence group behaviour and wellbeing. These characteristics place constraints on the possibility to select a group identity, and must be in place before collective mobilization can emerge. If people can easily switch between ethnic identities, members will be less likely to feel attached to the group, and might be inclined to change groups when it benefits them. This would reduce inequalities between groups until an equilibrium is reached (Stewart 2005). When identities are relatively static, however, members are more likely to develop feelings of belonging towards their group and therefore to experience inequalities collectively.

The shift towards studying horizontal inequalities (henceforth, simply inequalities) has proved fruitful, and the relationship between group inequalities and ethnic conflict has been more robustly established (see, for example, Murshed and Gates 2005; Østby 2008, Cederman, Gleditsch and Buhaug 2013). Research has shown that, when group inequalities coincide with identity cleavages, they may enhance group grievances and thus facilitate mobilization for conflict (Cederman, Weidmann and Gleditsch 2011). Nonetheless, the literature on the relationship between inequalities and conflict incidence is still limited in several ways.

First, while there is strong support in the literature for a positive relationship between educational inequalities and conflict incidence (Mancini 2008; Østby and Strand 2010), findings are less consistent for the impact of economic inequalities (e.g. Østby 2008; Raleigh and Hegre 2009; Buhaug et al. 2011; Cederman, Weidmann and Gleditsch 2011; Deiwiiks, Cederman and Gleditsch 2012). Contrasting results suggest that the relationship between inequalities and conflict is not necessarily straightforward, and that we should not assume that all types of horizontal inequalities have the same effect on the incidence of violence. As we explore in detail in the subsequent section, different types of inequalities might have different effects on ethnic conflict incidence, because the underlying mechanisms likely differ.

Second, cross-national research has, for the most part, focused on ethnic groups as the unit of analysis rather than ethnic dyads. The latter, however, more accurately captures the dynamics between groups in a conflict situation. Dyadic analysis allows us to observe subtler differences that would otherwise go unnoticed. For example, when studying inequality and conflict in Nigeria scholars often emphasize religious and economic differences between the poorer, Islamic north and the oil-rich, Christian south

(Montalvo and Reynal-Querol 2005; Fenske and Zurimendi 2017). While these differences are no doubt important, they cannot explain conflicts between for example, the Ijaw and the Itsekiri; two ethnic groups who largely share the same religion and live mainly in the southern region.

In her research, Østby (2008) takes a group-level approach, but her analysis only includes the two largest ethnic groups in a country. Although this is a significant step forward, including only the largest ethnic groups does not account for the complex multi-ethnic dynamics present in many societies. In Nigeria, for example, there are 3 main ethnic groups, (Yoruba, Igbo, and Hausa), but also dozens of other smaller ethnic groups that periodically have come into conflict with one another. In fact, only 9 out of 20 ethnic conflicts recorded in the Uppsala Conflict Database Program database (www.ucdp.uu.se) during the period 1990-2013 in Nigeria were between the three main ethnic groups. Thus, an approach that focuses only on the largest groups would miss over half of the conflicts in the country, such as the fighting between the Ijaws and Itsekiris. Additionally, since smaller ethnic groups are less likely to be vying for control of the state than larger ethnic groups, it is possible that the incentives for conflict differ between groups of different sizes. Fjelde and Østby (2014) attempt to account for this by comparing the wealth of the largest ethnic group in a region to that of the rest of the population within that region. However, this is an indirect measure of how economic inequality between groups can affect the chance of conflict between them. To gain better insight into this complexity, data including more than only the largest ethnic groups are needed.

Motivations or opportunities?

Regarding the factors influencing conflict outbreak, the inequality literature coalesces around two concepts that can potentially lead to conflict incidence: motivations and opportunities (Tilly 1978; Gurr 1993, 2000; Ellingsen 2000; Stewart 2005). Motivation for conflict is created by within-group feelings of frustration and resentment, whereas opportunity for conflict is related to the capacity of the group to mobilize for collective action. The former stems from grievances that are caused by inequalities, discrimination or defeat in prior conflicts. The latter derives from the ethnic group's strength relative to other groups.

The concepts of motivation and opportunity are not mutually exclusive. In fact, inequalities are likely to work through both mechanisms, as disparities in resources that cause resentment between groups may also inhibit them from mounting a successful insurgence (Esteban and Ray 2008). Without resources and

organization, grievances can do little to challenge powerful defenders of the status quo. People will only mobilize for collective action when organization, resources and opportunity are available, and even then only if they believe it is in their interest to do so (Tilly 1978).

That being said, to increase our understanding of the role of these mechanisms for conflict outbreak, it is important to discern between inequalities more strongly linked to motivations and those more strongly linked to opportunities. In this paper, we do this by distinguishing between three types of inequalities: educational inequalities, economic inequalities, and demographic inequalities. We posit that education is more strongly associated with motivation and economic and demographic inequalities with opportunities. In the next section, these forms of inequality are discussed and hypotheses are formulated regarding their effect on conflict outbreak.

Educational inequalities

Stewart (2005) highlights the importance of inequalities in social access to public services. In this paper, we focus on the differences in access to education, which is considered to be a major indicator of social inequality by Østby (2008). Government investments in education have a direct and lasting positive impact on people's lives and can help reduce the level of grievances in society (Aoki et al. 2002). Education may reduce conflict risk by encouraging political participation (Hegre 2003) and social cohesion (Thyne 2006). At the same time, more education increases the future prospects of individuals and thus increases the opportunity costs for potential recruits (Collier and Hoeffler 2004).

If education is unfairly distributed, it can become a main vehicle for frustration in society (De Ferranti et al. 2004). Differences in levels of education -- or in other social outcomes such as health and infrastructure -- may be severely felt by disenfranchised groups, since these are considered public goods and services. Under ideal circumstances, education would be evenly distributed across society. However, in reality its allocation often depends on the political power balance in the country. Under Apartheid in South Africa for example, the expenditure on education for white students was 14 times larger than that it was for black students (Stewart 2005).

Given the importance of education for development and wellbeing and the expectation of equal provision, we assume that education inequality is linked to conflict motivation. Esteban, Mayoral and Ray (2012), for example, argue that intergroup differentiation matters when the payoffs are for the entire

group, and group identification may influence the policies chosen, thereby negatively impacting other groups. This suggests that the larger educational inequalities between groups are, the stronger the feelings of resentment, increasing the likelihood of conflict.

H1: If educational inequalities between ethnic groups are larger, the tendency of the group with less education to engage in ethnic conflict is higher.

Economic inequalities

Although educational and economic inequalities may be correlated with each other, earlier studies have shown (Besançon 2005; Østby 2008) that this does not necessarily mean they will have the same effect on conflict. There are several reasons to believe that economic inequalities, which we measure through differences in the average levels of household asset wealth between groups, are less likely to be connected to conflict-inducing grievances than educational inequalities. First, inequalities in assets between groups may be less noticeable than educational inequalities, because many of them remain within the confines of the household. For example, if a trader of a certain ethnicity visits a village of a different ethnic group where a larger share of people has televisions and fridges, he will only be able to observe this if he enters a house in that village. However, he will be able to spot whether the village has a school or health centre as well as discern to some extent the quality of the facility. Second, even when economic inequalities are visible, economic assets are private so they could be attributed to individual welfare or productivity (vertical inequality) rather than group welfare. The trader will thus only observe that some households are better off, which is probably also the case for some households in his own community. If these differences are not perceived to fall across ethnic divisions, groups should not develop a sense of collective grievance. Third, private assets do not necessarily benefit the group as a whole, and therefore are less likely to be valued as much as public goods on the collective level. If we consider educational or economic gains as the prize for which ethnic groups fight for, education is a good that can be shared across the group at little to no cost, but economic prizes will become diluted depending on the size of the group. This will provide fewer incentives for individuals to engage in conflict (Esteban, Mayoral and Ray 2012). Fourth, even if economic inequalities are noticeable on a group level, they may be perceived to reflect lifestyle differences between groups. For example, nomadic Fula herdsmen in Sierra Leone are less likely to require the same household assets as Limba farmers. This

does not necessarily represent, a motivation for conflict, but is rather a reflection of the different lifestyles of each group.

We posit that the opportunity mechanism might offer a better explanation for the relationship between economic inequalities and conflict. Østby (2013) suggests that economic inequalities between groups may affect the rebel group's perception of their own capabilities – wealthier groups can afford to pay their recruits better and are therefore more capable of financing conflict. If the differences between groups are smaller, disadvantaged groups are more likely to have the resources to compete with the advantaged groups (Huber and Mayoral 2014). For example, in Rwanda the Hutus were historically less wealthy than the Tutsis, but in the decades before the genocide the imbalances between groups began to decrease after the Hutus gained political power in the 1960s (Bhavnani and Backer 2000; Gurr 2000). We thus hypothesize that an increase in economic inequality will actually *reduce* the chance of conflict incidence, since higher inequality between the groups may limit opportunities for rebellion.

H2: If economic inequalities between ethnic groups are larger, the tendency of the poorer group to engage in ethnic conflict is lower.

Demographic inequalities

When considering group differences in terms of relative capacity to engage in conflict, differences in population size between the groups should not be neglected. Horowitz (1985) contends that the closer the size of major ethnic groups, the greater the chance of domestic conflict or a coup d'état, as both parties believe they have an opportunity to win the conflict. Montalvo and Reynal-Querol (2005) argue that the propensity for conflict increases when a society is ethnically polarized, or divided into fewer and larger, equally-sized groups. As ethnic identities are often manipulated by elites for their own political or financial objectives (Varshney 2002), it makes sense that when there are fewer and larger groups it would be easier for elites to mobilize for collective action. The presence of fewer ethnic groups allows for divisions between groups to be more clearly defined, and larger groups indicate that there is a more substantial recruitment pool from which to mobilize.

Balcells, Daniels and Escribà-Folch (2016), for example, find that similarly sized rival communities that are in contact with each other are more at risk of violence due to increased intergroup competition and threat perception. Conversely, if the differences between groups are very large, the incentives for

conflict may be lower, because there is such a disparity in power and resources. Ellingsen's (2000) finding that countries with non-dominant ethnic majorities are more prone to domestic conflict than countries with dominant ethnic majorities tentatively supports this claim. Ethiopia provides a good example. The government, dominated by the relatively small Tigray ethnic group, has recently used repressive tactics against the two largest ethnic groups, the Oromos and the Amharas, because the latter have expressed discontent about being ruled by the Tigrayans.

Our prediction is that demographic inequalities, like economic inequalities, will be more associated to the opportunity mechanism, and therefore will have a negative effect on conflict incidence.

Poorer/smaller groups may instigate conflict believing that they have a better chance of winning when the differences with the other group are relatively small. Since a dyadic approach cannot test for the direction of violence, we do not rule out that smaller inequalities can also incentivise richer/larger groups to initiate conflict. In fact, Balcells, Daniels and Escribà-Folch (2016) argue that these groups may feel more threatened when the difference with the other group diminishes and engage in conflict in order to sustain or reinforce their status. However, Cederman, Gleditsch and Buhaug (2013) tested for whether wealthier groups are more conflict-prone and could not find strong evidence for this effect. For this reason, we restrict our hypotheses to the disadvantaged group.

H3: If differences in group size between ethnic groups are larger, the tendency of the smaller group to engage in ethnic conflict is lower.

Data

To test our hypotheses, we constructed an ethnic dyad database including information on 1,548 dyads of 285 ethnic groups living in 29 sub-Saharan African countries (for a list of all groups see Supplementary Table 1). The data used for constructing this database was derived from the Database Developing World (DDW) of the Global Data Lab (www.globaldatalab.org). We used data from 78 household surveys carried out between 1990 and 2014 as part of the Demographic and Health Survey (DHS) program. DHS are large nationally representative surveys that consist of a household survey, in which basic information is collected of all household members, and separate women's and men's surveys. We first constructed an ethnic group database by aggregating data to the ethnic group level for all ethnic groups for which the required information was available in the surveys. Information on the ethnic group of household members is sometimes asked in the household survey and sometimes in the women's or men's surveys.

The question most often used was 'What is your ethnic group/tribe?'. The respondent could choose from a number of predefined categories, or a category 'Other' followed by 'Specify'. Small ethnolinguistic tribes or sub-groups for which only a few observations were available were categorized into larger clusters of ethnolinguistically similar groups. Smaller ethnic groups that did not fit within a cluster and contained less than 1% of the observations within a country were excluded from the analysis.

The data included in the ethnic group database was used to form dyads of ethnic groups within each of the 29 countries. Each ethnic group was paired with all other ethnic groups within the same country, resulting in 1,548 ethnic dyads. Constructed in this way, the ethnic dyad database contains characteristics of both ethnic groups within the dyad and variables indicating differences between the characteristics of the groups. On the basis of this database an ethnic dyad panel dataset was constructed with yearly observations for the period 1990-2014. Because the data were derived from household surveys, we only had information for the years that surveys were held. For one country five surveys were available, for eight countries four surveys, for eight countries three surveys, for six countries two surveys and for six countries only one survey was available (see Supplementary Table 2). To obtain information for the years for which no dataset was available, the values of the survey nearest in time before the observation year were used. For the years before the first survey, the values of the first survey were used. If no survey preceding a specific year were available, data were extrapolated from later surveys. Since values of later years might be influenced by the conflict, a control factor indicating this situation was added to the model. To test the robustness of this approach, a second database with interpolated values for intervening years between surveys was created. Repeating the analyses with this dataset produced substantially similar results (see Supplementary Tables 3 and 4).

Data for the dependent variable, ethnic conflict, was compiled from the Uppsala Conflict Data Program (UCDP), which contains intrastate conflict observations consisting of rebellions against the state, non-state conflict and one-sided violence against civilians (by state or/and non-state actors) in countries in sub-Saharan Africa for the period 1990 to 2014. The datasets used are the UCDP Dyadic Dataset v.1-2015, UCDP Non-State Conflict Dataset v. 2.5-2015 and the UCDP One-sided Violence Dataset v 1.4-2015.

According to UCDP, ethnic conflict is defined as violence that occurs between ethno-linguistic groups. For the purpose of this research, ethnic conflict includes either (1) the use of armed force between two armed ethnic groups, or (2) the use of armed force by an organized ethnic group against civilians, resulting in at least 25 conflict-related casualties per year (Eck and Hultman 2007; Sundberg, Eck and

Kreutz 2012; Pettersson and Wallensteen 2015). The minimum threshold of 25 battle-related deaths allows for the inclusion of low-intensity conflict, whilst still separating group conflict from other types of low-intensity violence. We include an indicator for conflicts involving ethnic groups that are in power to distinguish between conflicts in which the state is involved and those where it is not. The period 1990-2014 was selected because of data availability. Additionally, by selecting conflicts starting in 1990 we can exclude ideological conflicts and external involvement from other countries during the Cold War.

Using the UCDP data, we constructed our dependent variable as a dummy variable taking the value one for years when a conflict is recorded within a specific dyad and 0 if otherwise. In total, we observe 731 intrastate conflict incidence observations. Of the 29 countries included in this study, 6 (Benin, Burkina Faso, Gabon, Malawi, Namibia and Zambia) did not have any observations of intrastate ethnic conflict during the years included in the analysis. Since we record the likelihood that conflict occurs for each year as opposed to only the year that violence breaks out, we observe conflict incidence rather than onset. Although there may be a distinction between these factors, other studies have shown it to have no impact on their results (see Esteban, Mayoral and Ray 2012).

The actors involved in a conflict observation were coded according to the ethnic groups described by the UCDP database and cross-checked with other sources (Olson 1996; Joshua Project 2016; Simons and Fennig 2017). Each conflict observation was matched to the corresponding ethnic dyad amongst which it took place. Ethnic groups within a dyad were treated equally, independent of by whom the conflict was initiated. For multi-ethnic actors, all ethnic groups that play a substantial role within the conflict are included as a separate ethnicity. We focus on intrastate domestic conflict and do not include cross-border wars. Conflicts in which the actors involved were foreign, where they could not be identified by ethnicity (e.g. the conflict in 2007 between the Black Axe/Bush Boys vs. Outlaws in Nigeria), or where they belonged to the same ethnic group (intra-Hutu violence in DR Congo) were excluded from the analysis.

Methods

To test our hypotheses, mixed-effects logistic regression analysis was used. We conducted a multilevel analysis to control for clustering due to the repeated measurement of the dyads over time and the nesting of observations within countries. We assess both the bivariate and multivariate associations between the independent and dependent variables. The dependent variable was a dummy indicating

whether (1) or not (0) in a given year an ethnic conflict has taken place between the groups in a dyad. The major independent variables were based on (differences between) characteristics of the ethnic groups in the dyads.

Educational inequality was measured through a variable indicating the difference in educational level between the groups. A group's educational level is the mean years of schooling of adults aged 20-49 in the group. Economic inequalities were measured in two ways - by the groups' wealth levels and the proportion of economic elites in a group. Wealth is measured as the mean value of the households belonging to the group on the International Wealth Index (IWI); a comparable welfare index that is based on the household's possession of consumer durables, quality of housing, and access to water and electricity (Smits and Steendijk 2015). IWI scores run from 0 to 100, with 0 representing households having none of the included durables and lowest quality housing/public utilities and 100 representing households having all the durables, as well as highest quality housing and utilities. For the proportion of economic elites, we calculated the percentage share working in higher (professional, managerial, technical) occupations within the group's male workforce in the 20-49 age category. Ethnic group size is measured by the percentage of the country's population that is member of the group. Both the dyad's average values (levels) and the differences (inequalities) between the two groups of education, wealth, employment and age are included in our analyses. Due to the presence of the mean values, the effects of the differences will indicate the relative inequalities for the respective indicator.

As we wish to observe conflict incidence, we control for temporal dependence by including dummy variables that indicate whether conflict is recorded in any of the four years prior to the conflict observation year. This enables us to isolate the factors that lead to conflict incidence from factors that occur during conflict and may determine conflict escalation. Controls for conflicts more than four years ago were also tested, but turned out not to be significant, so they were not included in the model. Differences in levels of urbanization between the groups and mean urbanization levels of the dyad are used as proxies to control for intergroup exposure and geographical concentration. The first control compares the difference in the percentage of population residing in urban compared to rural areas between ethnic groups, which can signal the level of exposure that groups have to each other. The second control measures the average share of the ethnic groups in the dyad that lives in an urban area, which provides a crude indication of whether groups are concentrated or dispersed.

We incorporate several controls for political factors into the model. On the group dyad level, we include an indicator for whether (1) or not (0) one of the ethnic groups in the dyad was in power in that year. On

the national level, we recorded the occurrence of regime change and a dummy was created coded as 1 in years that elections, military interventions or transitional governments were observed, and 0 otherwise. We further control for the country's democracy level, using the national polity score (to what extent it is autocratic or democratic, on a scale of -10 to 10 where 10 represents the most democratic level of government), derived from the Polity IV dataset (Marshall, Gurr and Harff 2015). Finally, we also control for the effect of the rule of law, taken from the World Governance Indicators (Kaufmann, Kraay and Mastruzzi 2010). This measure captures perceptions of the extent to which people have confidence in and abide by the rules of society. This applies in particular to the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. Estimates are on a country level and range on a scale from -2.5 to 2.5. As the World Bank first started recording governance indicators on a bi-annual basis in 1996, we use interpolation between years and extrapolation in the period 1990-1995. Missing values for the education, higher occupation and regime change variables were addressed using the dummy variable adjustment procedure (Allison 2001).

To study the bivariate effects of the independent variables, we estimated separate multilevel models for each of them. Given the intimate connection between the two components of the main independent variables (the difference component and the mean component), both components were included simultaneously in the bivariate analyses. Given the strong effects of conflict incidence in the preceding years, the dummies controlling for this were also included in these analyses. Also dummy variables for addressing missing values in the independent variables were included if necessary. To test for multicollinearity, we ran variation inflation factor (VIF) tests for the major independent variables. All VIF values were far below the critical threshold of 10 (Belsley, Kuh and Welsch 1980), hence there seems no noteworthy multicollinearity among these variables.

As the relationship between inequalities and conflict is not necessarily linear, we tested for nonlinear effects of the independent and control variables by adding quadratic terms to the model. We also tested for interaction effects among the major independent variables and between these variables and the control factors. Significant nonlinearities and interaction effects were included into the model.

Results

Descriptive statistics are presented in Table 1. In our dataset education levels range between 0 and 11.4 years, and the mean educational difference between the groups within the dyads is 1.6 years. Education

of the groups combined is, on average, 4.7 years. The mean difference in wealth is 7.8 on the IWI scale and the average wealth level of the groups is 22.4 on this scale (running from 0 to 100). The average elite share, represented by the proportion of ethnic group members in higher occupations, is 9.5%, and the average difference between groups in elite share is 6.6%. The mean ethnic group in a dyad represents 7% of the total population of a country, whilst the mean difference in population percentage between the groups in a dyad is 7.8%. The average proportion of groups in a dyad living in an urban area is 30.5%, and the difference in urbanization between groups is on average 17.3%.

The national polity scores range from -9 to 9 and the average is 1.1. The observations for the rule of law vary on a scale from -2.1 to 0.3 and are on average -0.8. The dummy variables for the control factors indicate that in 17.2% of dyads one of the groups is in power and that in 18.4% of the observation years a regime change took place.

Insert Table 1 here

The results of the multilevel logistic regression analyses are presented in Tables 2 and 3. Table 2 provides the coefficients for the bivariate relationships between the independent variables and ethnic conflict incidence, whilst Table 3 displays the coefficients for the multivariate relationships. In Table 3, Model 1 is the baseline model and Model 2 includes the interaction terms. Coefficients of the bivariate analyses were estimated in separate multilevel regression models, whereby the two components of the main independent variables (the difference component and the mean component) were estimated simultaneously. The number of dyad observations included in this analysis is 38,213 and the number of conflict-year observations is 731. The coefficients presented in the table are odds ratios, which are more easily interpretable than logit coefficients.

Insert Table 2 here

The bivariate coefficients in Table 2 essentially tell the same story as the multivariate coefficients in Table 3. The same variables have significant coefficients and the directions of the significant relationships are also similar. Most coefficients of the central variables are slightly stronger in the multivariate models. This suggests that their effects are somewhat suppressed bivariately, due to the influence of confounding factors. Given that the coefficients are so similar, we will focus our discussion of the results on the multivariate outcomes in Table 3.

Model 1 in Table 3 shows that the effect of education inequality is significantly positive. When the difference between groups in average years of education increases by one year, the odds of conflict is 41.5% higher, supporting H1. This may be due to larger differences in education that exacerbate the political and social tensions between groups and undermine the legitimacy of state institutions (Heyneman and Todoric-Bebic 2000). The effect of the overall educational level is significantly negative. In Model 1, an increase of one year of education reduces the odds of conflict incidence by 21.5%. Higher education levels increase the capacity to solve conflicts through dialogue instead of fighting. More education also increases the possibilities for individual social mobility and raises the cost of rebellion (Collier and Hoeffler 2004).

Insert Table 3 here

With respect to wealth inequality between groups, we find a significant negative relationship with conflict risk. The odds of conflict decrease by 6.9% when the wealth difference increases by one point on the IWI scale. There is no significant relationship between the average wealth level of the groups and conflict risk. Hence, the difference in wealth is a better predictor of conflict than the absolute level.

Regarding inequality in the size of the group's economic elites, the odds of conflict incidence decreases by 3.7% for each percentage point increase in the difference in proportion of ethnic group's members in higher-level occupations. Ethnic groups with different representation in the higher ranks of society thus seem less likely to compete for positions. If one group is mainly engaged in agriculture or manual work, whilst the other has a larger share of professional, managerial and technical occupations, there are less likely tensions due to a lack of employment opportunities for either group. The effect of the average percentage of members being part of the economic elite on conflict risk is positive – a percentage increase in the joint elite size will strengthen the odds of conflict occurring by 6.3%. This result is in line with the idea that conflict risk increases if the dyad's elites must compete for positions.

The relationship between inequality in population size and conflict is significantly negative. An increase of 1% in population difference reduces the chance of conflict by 3.4%. The direction is in line with H3, where a larger difference is associated with less conflict. Hence, it seems that groups that are more equal in size are more likely to engage in conflict. The population size of the groups combined has a significant nonlinear relationship with conflict (see Figure 1). In groups with higher joint population size, conflict risk is higher, but the strength of this association decreases when joint population size increases and plateaus when the joint population size is about 80%.

Insert Figure 1 here

With respect to the control factors, we find insignificant coefficients for urbanization. The variables accounting for prior conflict in the preceding three years have strong positive effects. The odds of conflict increase 16, 3, and 2.5 times respectively when there was a conflict one, two, or three years prior to the year of measurement. Hence, if the groups within a dyad have been involved in conflict recently, there is a high risk of conflict occurring again, although this effect wanes over time. The grievances experienced during conflicts in preceding years may easily create new tensions between the ethnic communities, which can spark further bouts of violence. The strong effect of the variable controlling for conflict in the preceding year is probably due to the fact that it captures uninterrupted conflict incidence. Control variables for conflict more than four years before the measurement year were not significant.

If one of the groups in the dyad is in power, the odds of conflict incidence are considerably higher. An explanation for this is that the groups might contest for political power, which could mean that the risk of conflict depends on the political context (Besançon 2005) and on what the prize at stake is (Esteban and Ray 2011). The democracy-level control variable shows that the national political context is also relevant. A one-point increase in the democracy level is associated with a 5.9% lower odds of ethnic conflict. An increase by one point in the rule of law is associated with a substantially (82.2%) lower odds of ethnic conflict). National regime change is not significantly related to ethnic conflict incidence.

Interactions

Interaction analysis was performed to assess the possibility of the effects of our major independent variables being contingent on other factors. Model 2 in Table 3 shows that in the interaction model the main effects of the independent variables do not alter much in strength and retain their significance.

Among our main independent variables, only one significant interaction effect was found: a positive interaction between education inequality and average wealth. This interaction suggests that education inequality is a more salient indicator of potential conflict among wealthier groups than among poorer groups.

There are several significant interactions between the political control variables and the main independent variables. National democracy level interacts positively with average education, and

negatively with population inequality and average urbanization. The first interaction indicates that joint educational level is more important for conflict reduction in societies that are less democratic. The second one suggests that a difference in population size between groups reduces conflict risk more strongly in societies that are more democratic. The third one indicates that, in more democratic societies, conflict risk is additionally reduced between urbanized groups. Average urbanization also interacts positively with one of the groups being in power, suggesting that a struggle for power increases the risk of conflict in urban areas. Finally, we find a positive interaction between the average size of the elites and rule of law. This suggests, that the rule of law is particularly important for reducing conflicts between groups with relatively small elites.

Conclusion and discussion

In this paper, we put forward the argument that educational, economic and demographic inequalities may have differing effects on the incidence of ethnic conflict. In particular, we expect educational inequalities to increase the risk of ethnic conflicts and economic and demographic inequalities to reduce the risk of such conflicts. To test our hypotheses, we built a new ethnic dyad database, composed of 1,548 ethnic dyads, representing 285 different ethnic groups in twenty-nine Sub-Saharan African countries. Multilevel logistic regression results indicate that – in line with our expectations – higher levels of educational inequality are associated with increased risk of ethnic conflict, whereas higher levels of economic inequality and of population differences are associated with lower ethnic conflict risk. We also find that ethnic dyads with lower joint educational levels, ethnic dyads that together make up a larger share of the country's population, and ethnic dyads with a larger joint proportion of economic elites are more likely to be involved in ethnic conflicts.

These findings are important, as they indicate that there is not a general effect of inequality on ethnic conflict. Instead, different kinds of inequalities appear to have divergent effects on conflict risk. To our knowledge, this is the first comprehensive cross-country study that finds divergent effects for group inequalities on ethnic conflict. Opposing effects on conflict have been observed when examining different types of inequalities between individuals (Besançon 2005), but not when inequalities between groups were studied (Østby 2008). Our results thus challenge a narrative in the literature that economic inequalities between groups will lead to conflict (Østby 2013; Cederman, Gleditsch and Buhaug 2013).

From a theoretical perspective, it is possible that different types of inequalities have a varying importance within society, and may also be managed differently by its members (Cramer 2003). We argue that inequalities that work through primarily through the motivation mechanism, such as education inequalities, are likely to be conflict enhancing. This follows the conventional argument that inequalities are grievance inducing and that an increase in disparities will amplify feelings of injustice and subsequently lead groups to mobilize collectively against each other (Stewart 2005; Østby 2008; Cederman, Gleditsch and Buhaug 2013). However, when inequalities are more likely to represent the opportunity mechanism (Besançon 2005; Huber and Mayoral 2014), such as with economic and demographic inequalities, we argue that they will have a negative relationship with conflict. In these situations, groups nearing parity are more prone to conflict than unequal groups. This echoes Balcells, Daniels and Escribà-Folch's (2016) finding for Northern Ireland, where population parity between religious groups was more likely to lead to conflict incidence.

The results also provide some support for Esteban, Mayoral and Ray's (2012) ethnic polarization theory. Between-group parity indicates ethnic polarization: the larger, richer and more similarly sized ethnic groups are, the more likely the chance of conflict incidence between them (Montalvo and Reynal-Querol 2005). Although our analysis is focused on dyads and does not account for the overall composition of ethnic groups in society, it provides evidence in favour of their claim that large groups are more likely to participate in conflict when they are similarly sized.

Besides the direct effects of our independent variables, we also studied interaction effects. This analysis revealed that the effect of educational inequality depends on the joint wealth levels of the groups in the dyad, with the negative association between educational inequality and conflict risk being even stronger if the groups are wealthier. This suggests that the grievance effect created by educational inequalities might become more poignant as groups become wealthier and therefore expect more provision of public services from the state.

We also found a positive interaction between average education and the level of democracy, suggesting that a higher educational level might be particularly important for conflict reduction in less democratic societies. More education can increase the future prospects of individuals and subsequently raise the opportunity costs for potential rebel recruits (Collier and Hoeffler 2004). Moreover, it may also be that educated individuals are more conformist to the state (Wimmer 2009), and therefore less likely to take up arms against it. Our findings also showed that the effect of population differences on the chance of conflict incidence is contingent on the country's level of democracy, with a large discrepancy in size

reducing the conflict risk between ethnic groups in more democratic countries. A possible explanation is that there is less incentive to resort to violence when minorities are more able to participate in the government and groups can represent their interests through conventional political channels (Cederman, Gleditsch and Buhaug 2013).

We further found that the effect of average urbanization is dependent on whether an ethnic group in the dyad is in power and on the level of democracy in the country. When studying the effects of group segregation and concentration on conflict incidence, Kasara (2017) found that fewer positive intergroup interactions can reduce interethnic trust, and subsequently increase the risk of violence. Our findings indicate that dyads with ethnic groups in power are more susceptible to conflict than others, which potentially hints at ethnic conflict having a political aspect. Since this appears to be particularly the case when ethnic groups are more urbanized, we speculate that a tense ethnopolitical environment coupled with an increased proximity of groups might stimulate negative interethnic interactions, as was the case in Northern Ireland (Balcells, Daniels and Escribà-Folch 2016). However, if a country moves towards a political system that is more democratic and allows for better representation, an environment where interethnic trust can be cultivated may be more feasible. In this context, closer proximity and exposure to each other is likely to reduce the chance of conflict. Finally, the positive interaction effect of elites and rule of law on conflict implies that the influence of ethnic elites can be very powerful, in spite of perceived improvements in the rule of law.

There are some limitations to the study that should be noted. First, a disadvantage of dyadic analysis is that it cannot include the effects of vertical intragroup inequalities, which may affect the group's cohesiveness (Stewart 2005) or its ability to sustain a conflict (Huber and Mayoral 2014), thus influencing the incentives for initially engaging in conflict (Kuhn and Weidmann 2015). Every method, however, has its limitations and including intragroup inequalities is not possible with a dyad approach, which is the major strength of the current paper. Second, with respect to the data, in some DHS surveys, ethnic groups did not have sufficient respondents. In order to have enough observations per group for the analysis, smaller ethnic groups had to be combined with others into larger ethnic clusters. This process inevitably led to some cases in which conflicts included ethnic groups that fell within the same ethnic cluster, and therefore could not be captured in the analysis. Nevertheless, our study is still a significant improvement over previous research, because it manages to incorporate far more ethnic groups than has been done before. It provides a more granular analysis, which takes local conflicts between smaller groups into account.

In future research, it would be important to study whether the motivation argument extends to other types of social inequalities, such as differences in healthcare and infrastructure. Additionally, the public-private element of the inequality should be considered in greater detail, since our findings suggest that groups that are deprived from publicly administered resources are more likely to feel aggrieved than groups that are deprived from private resources. This could be done by, for example, studying inequalities in private and public employment more in depth once reliable disaggregated data on employment categories becomes available. Furthermore, it is possible that actual inequalities do not match up with perceived inequalities, due to potential bias stemming from personal background, lack of access, inaccurate media reporting elite manipulation, or simple miscalculation (Langer and Mikami 2013). According to Langer and Smedts (2013) people will often act according to their beliefs as opposed to the actual facts. More investigation is thus needed on the role of 'objective' inequalities vs. perceptions of grievance, in order to increase our understanding of the dynamics of this relationship.

With respect to interactions between inequalities, Besançon (2005) speculated that rich ethnic groups who feel politically oppressed may have sufficient wealth to provide the opportunity for rebellion. A similar argument could apply for group size, since a larger population means a larger pool of recruits to mobilize for collective action if the group feels politically disadvantaged, such as the Oromo in Ethiopia or the Hutus in Rwanda. More recently, Cederman, Gleditsch and Buhaug (2013) observed that ethnic groups who are both poorer than the national average and are politically excluded from power are more conflict prone than others. In contrast, we discover no evidence for significant interactions between different types of inequalities and conflict. That being said, the scope of our analysis is limited to socioeconomic inequalities, and it would be fruitful in future research to investigate the interactions between socioeconomic and political inequalities in a more systematic way than is possible in this paper.

In sum, our results indicate that the type of inequality matters when analysing the likelihood of conflict occurrence. We argue that the direction of the effects depends on whether the inequality is most associated with motivation or with opportunity. Inequalities that are positively associated with conflict incidence are presumed to be more closely linked to the motivation claim, whereas inequalities that are negatively associated with conflict are more likely linked to opportunity arguments. Our study improves upon earlier work by including all ethnic groups for which enough data was available and in taking ethnic dyads as the unit of analysis. Whereas earlier research only used disaggregated national data (Collier and Hoeffler 2004), focused only on the major ethnic groups (Østby 2008) or used indirect measures, such as the difference with the national (Cederman, Gleditsch and Buhaug 2013) or regional average (Fjelde and

Østby 2014), our dyadic approach allows us to compare differences between most groups within a country directly. This has the advantage that more richness is added to the findings and that also the determinants of small-scale local conflicts are captured. By directly measuring the socioeconomic characteristics of group members, our study is able to capture a more complex relationship between different types of horizontal inequalities and conflict outbreak.

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Table 1 - Descriptive statistics summary

Variables	Mean	Standard Deviation	Minimum	Maximum
Conflict incidence (%)	1.85%	13.4%	0	1
Education inequality (years)	1.64	1.61	0	11.40
Average education (years)	4.69	2.25	0.10	12.75
Wealth inequality (IWI)	7.81	8.72	0	80.60
Average wealth (IWI)	22.36 %	11.55 %	2.15 %	93.40 %
Elite share inequality (%)	6.68 %	10.13 %	0 %	100 %
Average elite share (%)	9.55 %	7.90 %	0 %	59.90 %
Population inequality (%)	7.79 %	10.53 %	0 %	87.03 %
Average population (%)	7.03 %	6.45 %	0.12 %*	43.87 %
Difference in urbanization (%)	17.29 %	16.09 %	0 %	96.00 %
Average urbanization (%)	30.60 %	17.25 %	0 %	94.90 %
Conflict occurred 1 year prior (%)	01.78 %	13.21 %	0	1
Conflict occurred 2 years prior (%)	0.72 %	8.43 %	0	1
Conflict occurred 3 years prior (%)	0.54 %	7.36 %	0	1
Conflict occurred 4 years prior (%)	0.47 %	6.85 %	0	1
Regime change (%)	16.23 %	36.88 %	0	1
Level of democracy (polity)	1.07	4.71	-9	9
Ethnic group in power (%)	16.33 %	36.97 %	0	1
Rule of law (WGI)	-0.82	0.50	-2.13	0.35

*Minimum cut-off value is set at 1%.

Table 2 - Multilevel logistic regression coefficients for bivariate associations between selected independent variables and ethnic conflict incidence in sub-Saharan African countries, 1990-2014

Variables	Bivariate Coefficients
Education inequality	1.165** (0.052)
Average education	0.846** (0.062)
Wealth inequality	0.973* (0.013)
Average wealth	0.997 (0.011)
Elite share inequality	0.972* (0.013)
Average elite share	1.043*** (0.011)
Population inequality	0.964** (0.014)
Average population	1.251*** (0.044)
Average population ²	0.997* (0.001)
Urbanization inequality	0.994 (0.006)
Average urbanization	0.99 (0.008)
Conflict occurred 1 year prior	27.445*** (0.164)
Conflict occurred 2 years prior	4.997*** (0.22)
Conflict occurred 3 years prior	3.395*** (0.258)
Conflict occurred 4 years prior	2.132* (0.318)
Regime change	0.989 (0.133)
Level of democracy	0.936*** (0.012)
Ethnic group in power	2.993*** (0.144)
Rule of law	0.128*** (0.284)
Observations	38,213
Conflict-year combinations	731

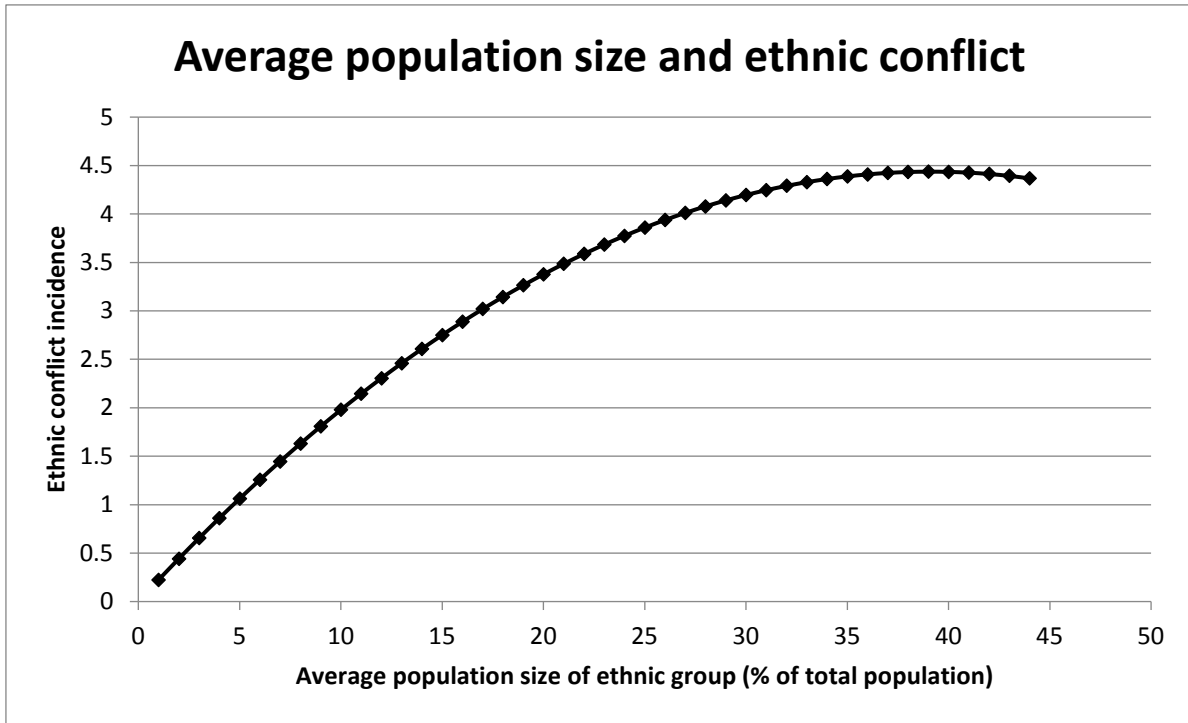
Coefficients are the log odds for the variables in the models and estimates for random-effects parameters, with standard errors in parentheses. * $p < .05$; ** $p \leq .01$; *** $p \leq .001$. Models were estimated for each variable separately, whereby both components of the major variables (inequality and mean) were estimated simultaneously.

Table 3 - Multilevel logistic regression coefficients for multivariate associations between selected independent variables and ethnic conflict incidence in sub-Saharan African countries, 1990-2014

Variables	Model 1	Model 2
Constant	0.000*** (0.628)	0.000*** (0.648)
Education inequality	1.415*** (0.07)	1.304*** (0.075)
Average education	0.785* (0.101)	0.798* (0.104)
Wealth inequality	0.934*** (0.018)	0.926*** (0.019)
Average wealth	1.014 (0.019)	1.001 (0.021)
Elite share inequality	0.963* (0.016)	0.967* (0.017)
Average elite share	1.063*** (0.013)	1.063*** (0.015)
Population inequality	0.966* (0.015)	0.963* (0.016)
Average population	1.251*** (0.049)	1.263*** (0.051)
Average population ²	0.997* (0.001)	0.997* (0.001)
Urbanization inequality	1.011 (0.008)	1.014 (0.008)
Average urbanization	1.000 (0.01)	0.993 (0.011)
Conflict occurred 1 year prior	16.174*** (0.157)	14.488*** (0.158)
Conflict occurred 2 years prior	3.327*** (0.216)	3.112*** (0.217)
Conflict occurred 3 years prior	2.496*** (0.258)	2.361** (0.259)
Conflict occurred 4 years prior	1.592 (0.321)	1.478 (0.321)
Regime change	1.126 (0.141)	1.157 (0.139)
Level of democracy	0.941*** (0.017)	0.946** (0.018)
Ethnic group in power	3.413*** (0.156)	3.563*** (0.163)
Rule of law	0.178*** (0.319)	0.132*** (0.342)
Education inequality * average wealth		1.016*** (0.004)
Average education * democracy level		1.023** (0.007)
Average elite share * rule of law		1.073** (0.023)
Average urbanization * democracy level		0.998* (0.001)
Average urbanization * ethnic group in power		1.023* (0.01)
Population inequality * democracy level		0.997* (0.001)
<i>Random-intercept parameters</i>		
Country level	1.934*** (0.399)	1.995*** (0.412)
Ethnic dyad level	1.89*** (0.164)	1.939*** (0.168)
Omnibus test Chi ² (DF)	722.25*** (23)	729.52*** (29)
Observations	38,213	38,213
Conflict-year combinations	731	731

Coefficients are the log odds for the variables in the models and estimates for random-effects parameters, with standard errors in parentheses. *p<.05; **p≤.01; ***p≤.001.

Figure 1 – Predicted relationship between average population size and ethnic conflict incidence



Supplementary Table 1 – Demographic and Health Surveys included in panel data analysis

Country	Survey Years				
Angola	2011				
Benin	1996	2001	2006	2011	
Burkina Faso	1993	1998	2003	2008	
Cameroon	1998	2004	2011		
Central African Republic	1994				
Chad	1997	2004			
Congo	2005	2011			
Democratic Republic of Congo	2007	2013			
Ivory Coast	1994	1999	2005	2011	
Ethiopia	2000	2005	2011		
Gabon	2000	2012			
Ghana	1998	2003	2008		
Guinea	1999	2005	2012		
Kenya	1993	1998	2003	2008	
Liberia	2007	2013			
Malawi	2000	2004	2010		
Mali	1995	2001	2006	2013	
Mozambique	1997	2003	2011		
Namibia	1992	2000	2006	2013	
Niger	1998	2006	2012		
Nigeria	1999	2003	2008	2013	
Rwanda	1992				
Senegal	1992	1997	2005	2011	2012
Sierra Leone	2008	2013			
South Africa	1998				
Togo	1998				
Uganda	1995	2001	2006	2011	
Zambia	1996	2002	2007		
Zimbabwe	1994				

Supplementary Table 2 – List of ethnic group clusters derived from the Demographic and Health Surveys

Adja Benin	Bakongo North and South Congo DR	Chewa Malawi	Hutu Rwanda
Bariba Benin	Bas-Kasai and Kwilu-Kwngo Congo DR	Tumbuka Malawi	Tutsi Rwanda
Dendi Benin	Cuvette central Congo DR	Lomwe Malawi	Twa Rwanda
Fon Benin	Ubangi and Itimbiri Congo DR	Tonga Malawi	Wolof Senegal
Yoa/Lokpa Benin	Uele Lake Albert Congo DR	Yao Malawi	Fulani Senegal
Betamaribe Benin	Basele-K, Man. and Kivu Congo DR	Sena Malawi	Serer Senegal
Peulh Benin	Kasai, Katanga and Tanganika Congo DR	Nkonde Malawi	Mandinka/Malinke Senegal
Yoruba Benin	Lunda Congo DR	Ngoni Malawi	Jola Senegal
Peulh Benin	Pygmy Congo DR	Mang'anja/Nyanja Malawi	Soninke Senegal
Bobo Burkina Faso	Afar Ethiopia	Lambya Malawi	Bambara Senegal
Dioula Burkina Faso	Amhara Ethiopia	Ndali Malawi	Temne Sierra Leone
Fulfulde/Peul Burkina Faso	Guragie Ethiopia	Bambara Mali	Mende Sierra Leone
Gourmantché Burkina Faso	Oromo Ethiopia	Malinké Mali	Fula Sierra Leone
Gourounsi Burkina Faso	Sidama Ethiopia	Peulh Mali	Creole Sierra Leone
Lobi Burkina Faso	Somalie Ethiopia	Sarakolé/Soninké/Marka Mali	Mandingo Sierra Leone
Mossi Burkina Faso	Tigray (Tigraway) Ethiopia	Sonrai/Songhai Mali	Loko Sierra Leone
Senufo Burkina Faso	Welaita Ethiopia	Dogon Mali	Sherbro Sierra Leone
Touareg (Bella) Burkina Faso	Nilotic Ethiopia	Tamasheq/Tuareg Mali	Limba Sierra Leone
Bissa Burkina Faso	Omotic Ethiopia	Senoufo/Minianka Mali	Kono Sierra Leone
Dagara Burkina Faso	Fang Gabon	Bobo Mali	Black/African South Africa
Dafing Burkina Faso	Kota-Kele Gabon	Emakhuwa Mozambique	Colored South Africa
Samo Burkina Faso	Mbede-Teke Gabon	Portuguese Mozambique	White South Africa
Hausa CAR	Myene Gabon	Xichangana Mozambique	Asian/Indian South Africa
Sara CAR	Nzabi-Duma Gabon	Cisena Mozambique	Adja-Ewe Togo
Mbum CAR	Okande-Tsogho Gabon	Elomwe Mozambique	Akposso/Akebou Togo
Gbaya CAR	Shira-Punu/Vili Gabon	Echuwabo Mozambique	Ana-Ife Togo
Mandjia CAR	Pygmee Gabon	Shona Mozambique	Kabye/Tem Togo
Banda CAR	Akan Ghana	Cinyungwe Mozambique	Para-Gourma/Akan Togo
Ngbaka-Bantu CAR	Ga / Dangme Ghana	Cibalke Mozambique	Acholi Uganda
Yakoma-Sango CAR	Ewe Ghana	Bitonga Mozambique	Alur Uganda
Zande-Nzakara CAR	Guan Ghana	Cicewa Mozambique	Adhola Uganda
Gorane Chad	Mole-Dagbani Ghana	Ciyao Mozambique	Bafumbira Uganda
Arab Chad	Grussi Ghana	Cichopi Mozambique	Baganda Uganda
Ouaddai Chad	Gruma Ghana	Cindau Mozambique	Bagisu Uganda
Baguirmien Chad	Hausa Ghana	Shimakonde Mozambique	Bagwere Uganda
Kanem-Bornou Chad	Dagarti Ghana	Chitewe Mozambique	Bakiga Uganda
Fitri-Batha Chad	Mande Ghana	Xitswa Mozambique	Bakonjo Uganda
Hadjarai Chad	Sousou Guinea	Xitsonga Mozambique	Banyakole Uganda

Lac Iro Chad	Peulh Guinea	Kimwane Mozambique	Banyarwanda Uganda
Sara Chad	Malinke Guinea	Coti Mozambique	Banyole Uganda
Tandjile Chad	Kissi Guinea	Afrikaans Namibia	Banyoro Uganda
Peul Chad	Toma Guinea	Damara>Nama Namibia	Basoga Uganda
Mayo-Kebbi Chad Arab-	Guerze Guinea	English Namibia	Batoro Uganda
Choa/Peulh/Haoussa/Kanuri Cameroon	Kalenjin Kenya	Herero Namibia	Iteso Uganda
Biu-Mandara Cameroon	Kamba Kenya	Kavango languages Namibia	Karimojong Uganda
Adamaoua-Oubangui Cameroon	Kikuyu Kenya	Caprivi languages Namibia	Lango Uganda
Bantoïde South-West Cameroon	Kisii Kenya	Oshiwambo Namibia	Lugbara Uganda
Grassfields Cameroon	Luhya Kenya	Tswana Namibia	Madi Uganda
Bamilike/Bamoun Cameroon	Luo Kenya	San Namibia	Bemba Zambia
Côtier/Ngoe/Oroko Cameroon	Maasai/Samburu Kenya	Arab Niger	Lala Zambia
Beti/Bassa/Mbam Cameroon	Meru/Embu Kenya	Djerma/Songhai Niger	Bisa Zambia
Kako/Meka/Pygmé Cameroon	Mijikenda/Swahili Kenya	Gourmantché Niger	Ushi Zambia
Akan Ivory Coast	Somali Kenya	Hausa Niger	Lamba Zambia
Kru Ivory Coast	Taita/Taveta Kenya	Kanuri/Toubou Niger	Tonga Zambia
Mand (north) Ivory Coast	Turkana Kenya	Mossi Niger	Lenje Zambia
Mand (south) Ivory Coast	Kuria Kenya	Peul Niger	Luvale Zambia
Voltaic Ivory Coast	Bassa Liberia	Touareg Niger	Lunda Zambia
Burkina Faso Ivory Coast	Gbandi Liberia	Ibibio/Efik Nigeria	Mbunda Zambia
Mali Ivory Coast	Belle Liberia	Bini/Edo/Urhobo Nigeria	Kaonde Zambia
Kongo Congo Brazaville	Dey Liberia	Fulani Nigeria	Lozi Zambia
Eshira Congo Brazaville	Gio Liberia	Hausa Nigeria	Chewa Zambia
Duma Congo Brazaville	Gola Liberia	Egbira/Igbira/Ibira Nigeria	Nsenga Zambia
Mbéré/Mbéti/Kélé Congo Brazaville	Grebo Liberia	Igala/Igbala Nigeria	Ngoni Zambia
Téké Congo Brazaville	Kissi Liberia	Igbo Nigeria	Mambwe Zambia
M'bochi Congo Brazaville	Kpelle Liberia	Ijaw/Izon Nigeria	Namwanga Zambia
Sangha Congo Brazaville	Krahn Liberia	Kanuri/Berberi Nigeria	Tumbuka Zambia
Kota Congo Brazaville	Kru Liberia	Nupe Nigeria	Black Zimbabwe
Makaa Congo Brazaville	Loma Liberia	Ogoni Nigeria	White Zimbabwe
Oubanguiens Congo Brazaville	Mandigo Liberia	Tiv Nigeria	Coloured Zimbabwe
Pygmée Congo Brazaville	Mano Liberia	Yoruba Nigeria	Asian Zimbabwe
	Mende Liberia	Middle Belt Nigeria	
	Sarpo Liberia	Annang Nigeria	
	Vai Liberia		

Supplementary Table 3 - Multilevel logistic regression coefficients for bivariate associations between selected independent variables and ethnic conflict incidence in sub-Saharan African countries, 1990-2014 (interpolated data)

Variables	Bivariate Coefficients
Education inequality	1.156** (0.053)
Average education	0.802*** (0.063)
Wealth inequality	0.983 (0.013)
Average wealth	0.99 (0.011)
Elite share inequality	0.97* (0.014)
Average elite share	1.049*** (0.012)
Population inequality	0.968* (0.014)
Average population	1.241*** (0.044)
Average population ²	0.997* (0.001)
Urbanization inequality	0.999 (0.006)
Average urbanization	0.984* (0.008)
Conflict occurred 1 year prior	27.582*** (0.165)
Conflict occurred 2 years prior	5.007*** (0.22)
Conflict occurred 3 years prior	3.366*** (0.258)
Conflict occurred 4 years prior	2.108* (0.318)
Regime change	0.988 (0.141)
Level of democracy	0.938*** (0.012)
Ethnic group in power	2.996*** (0.144)
Rule of law	0.128*** (0.284)
Observations	38,281
Conflict year combinations	731

Coefficients are the log odds for the variables in the models and estimates for random-effects parameters, with standard errors in parentheses. * $p < .05$; ** $p \leq .01$; *** $p \leq .001$. Models were estimated for each variable separately, whereby both components of the major variables (inequality and mean) were estimated simultaneously. The number of observations in this analysis is slightly higher than in the dataset with extrapolated values because there are more observations for average population above the minimum cut-off value (1%).

Supplementary Table 4 – Multilevel logistic regression coefficients for multivariate associations between selected independent variables and ethnic conflict incidence in sub-Saharan African countries, 1990-2014 (interpolated data)

Variables	Model 1	Model 2
Constant	0.000*** (0.615)	0.000*** (0.638)
Education inequality	1.355*** (0.07)	1.252** (0.074)
Average education	0.720** (0.101)	0.738** (0.105)
Wealth inequality	0.941** (0.018)	0.934*** (0.019)
Average wealth	1.037 (0.02)	1.019 (0.021)
Elite share inequality	0.958** (0.017)	0.963* (0.017)
Average elite share	1.073*** (0.014)	1.071*** (0.015)
Population inequality	0.969* (0.015)	0.965* (0.016)
Average population	1.243*** (0.048)	1.256*** (0.05)
Average population ²	0.997* (0.001)	0.997* (0.001)
Urbanization inequality	1.014 (0.008)	1.017* (0.008)
Average urbanization	0.990 (0.011)	0.985 (0.012)
Conflict occurred 1 year prior	16.894*** (0.158)	15.087*** (0.159)
Conflict occurred 2 years prior	3.476*** (0.217)	3.251*** (0.217)
Conflict occurred 3 years prior	2.596*** (0.259)	2.445** (0.259)
Conflict occurred 4 years prior	1.643 (0.32)	1.531 (0.32)
Regime change	1.097 (0.14)	1.124 (0.139)
Level of democracy	0.939*** (0.017)	0.944** (0.018)
Ethnic group in power	3.356*** (0.155)	3.502*** (0.161)
Rule of law	0.189*** (0.318)	0.144*** (0.343)
Education inequality * average wealth		1.015** (0.004)
Average education * democracy level		1.020** (0.007)
Average elite share * rule of law		1.076** (0.024)
Average urbanization * democracy level		0.998* (0.001)
Average urbanization * ethnic group in power		1.025** (0.01)
Population inequality * democracy level		0.997** (0.001)
<i>Random-effects parameters</i>		
COW	1.846*** (0.385)	1.941*** (0.403)
Ethnic dyad	1.842*** (0.162)	1.892*** (0.165)
Omnibus test Chi ² (DF)	726.12*** (23)	732.66*** (29)
Observations	38,281	38,281
Conflict year combinations	731	731

Coefficients are the log odds for the variables in the models and estimates for random-effects parameters, with standard errors in parentheses. *p<.05; **p<.01; ***p<.001. The number of observations in this analysis is slightly higher than in the dataset with extrapolated values because there are more observations for average population above the minimum cut-off value (1%).