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A Micro-Level Perspective on the Relationships between Presence of Armed Groups, Armed Conflict Violence, and Access to Aid in Mopti, Mali

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Abstract: This paper exploits a unique panel dataset of households in Mopti whose baseline was collected in January 2012, just prior to the outset of the civil war in Mali. The follow-up survey was implemented in January 2017, in the midst of a rapidly intensifying armed conflict in the region. This paper addresses three research questions: (i) which pre-crisis characteristics of villages best explain the subsequent local presence of armed groups and local intensity of conflict-related violence? (ii) How the presence of armed groups and conflict-related violence are related to each other, and how they manifest themselves in the lives of communities? and (iii) what role the presence of armed groups and conflict-related violence play in the geographic allocation of aid? Answering these questions help us shed light on the determinants of vulnerability to conflict, on processes of armed conflict and on the relationships between aid and conflict.

1. Introduction

There is now an extensive empirical literature documenting the adverse impact of armed conflicts on individuals' human capital using household surveys and a micro-economic perspective. Examples of such papers are Akresh and De Walque (2008), Chamarbagwala and Moran (2011), Shemyakina (2011), Leon (2012) or Akbulut-Yuksel (2014) on education and Bundervoet, Verwimp and Akresh (2009), Minoiu or Shemyakina (2014) on health and nutrition. Other papers in the same mold have also looked at the impact of armed conflict on pro-sociality - often with counter-intuitive results (see Bauer et al. 2016). Most of these papers focus their attention on solving the endogeneity issue arising from the non-randomness of conflict and typically uses instrumental variables and/or difference-in-differences (sometimes coupled with matching). The goal is to isolate some exogenous variations in conflict likelihood or intensity to obtain a causal estimate of the impact of conflict. For instance, many studies compare children being born in conflict-affected areas with children being born at the same time but in less exposed areas and/or with children born in the same area but before or after the conflict. Conflict is typically operationalized by the number of events or fatalities at some administrative level or by direct exposure to killings and injuries in the household. These papers are firmly rooted in a reduced form

approach in that they do not attempt to model conflict itself. Some critical questions related to conflict dynamics are thus left unanswered.

In this paper, we intend to use the same micro-level perspective to better understand the different characteristics of conflict, in terms of its geographical distribution, the forms it takes, and its relationship with aid. In so doing, we provide a conflict vulnerability analysis that contributes to our understanding of peoples' lives in conflict contexts. The key contributions of the paper are based on a unique household panel dataset in Mopti, Mali, whose first wave was collected just *before* the conflict onset. This is especially valuable since central Mali was unaffected by previous rebellions in the country. This allows us to look at how pre-conflict characteristics shape subsequent conflict dynamics. The dataset contains rich and wide information on the conflict. Specifically, we collected information on the presence of armed groups, on exposure to violence, and on several potential correlates of conflict such as insecurity and crime, fear of traveling, service disruption, social capital and access to aid. When we combine this information with external data on conflict events (from ACLED and UCDP), we are able to comprehensively characterize the conflict in central Mali, distinguishing between the notions of *presence of armed groups* and of *conflict-related violence*.

Based on this unique data, we conduct a threefold analysis. First, we investigate the determinants of the presence of armed groups and of conflict-related violence at village-level. To do that, we aggregate information from survey respondents, community leaders' interviews and external data. We create a binary variable taking the value 1 if armed groups were present in the village in the study period and 0 otherwise. We also calculate the total number of conflict events and conflict-related fatalities that took place within an arbitrary radius of 10 kilometers around each village in the sample, based on events information from ACLED. We extract information from the baseline data to document the pre-conflict characteristics of villages in terms of geography and service provision, social composition, agricultural development, and household welfare and we estimate which of these characteristics predict subsequent forms of conflict.

Second, we explore the mechanisms through which the presence of armed groups and the extent of local conflict violence could mediate the impact of conflict on human capital. Specifically, we look at the correlations between presence of armed groups and conflict violence on crime and insecurity, fear of traveling (mobility restriction), social capital, and disruption in service provision. This analysis is not causal as we do not attempt to address the non-randomness of conflict. Instead, the goal of the analysis is to document which of the mechanisms that are often advanced in the literature to explain why conflicts exert such a long-lasting impact of people and communities are specifically relevant in the context of Mali. The analysis also examines separately the mechanisms associated with the presence of armed groups to those associated with the intensity of violence.

Third, we investigate the allocation of aid during conflict. Very little is known about how the presence of conflict affects aid allocation. Lis, (2014) shows that multilateral and bilateral donors respond differently in the event of conflict in a given aid recipient country and find that conflict reduces multilateral aid but increases bilateral assistance. In contrast, Rodella-Boitreaud and Wagner (2011) and Brück & Xu, (2012) find little to no effect of conflict on aid allocations. Stoddard, (2017) find that insecurity influences the type of aid as it makes it more difficult to implement aid requiring technical complexity and high level of targeting, and that the most insecure countries have a higher allocation of aid going into distribution of food and shelter/non-food items and a lower proportion going into the health sector than in the more secure countries. This is due to health aid requiring more complex implementation and sustained presence. These findings are supported by cross-sectional macro-level analyses which point out that food aid increases in response to conflict (Kuhlgatz, Abdulai, and Barrett,

2010; Young and Abbott 2008). Campbell and Findley (2016) suggest that most donors increase aid during conflict and decrease aid when the conflict has stabilized.

Bezerra and Braithwaite (2016) uses data on sub-national bilateral aid commitments from the AidData consortium and data on domestic conflicts and transnational terrorism in local areas (using standardized geographic grid cells) in 22 Sub-Saharan African states experiencing civil war between 1990 and 2007. Their results suggest that donors commit more aid to areas with recent political violence in the form of transnational terrorism and state conflict. Additionally, such locations continue to receive higher aid commitments for the 6-8 years following the conflict. On the other hand, they also find that potential donors are deterred from giving *new* assistance to areas experiencing severe levels of violence.

Van Weezel (2017) use district level data for Uganda between 2002-2010 along with information on conflict and foreign aid commitments and disbursements to estimate the effect of conflict on aid allocation at the subnational level. In order to circumvent the problem of reverse causality, the author exploits an exogenously driven shock in conflict intensity in Uganda in a differences-in differences framework. Results show that districts affected by sudden conflict see both lower aid commitments and disbursements. The analysis finds that 170 extra fatalities are associated with a 19% reduction in disbursements and 21% reduction in commitments. This suggests that donors are risk adverse, preferring to allocate aid to less risky areas. Similarly, using an IV strategy, Ghorpade (forthcoming) finds that conflict reduced households' access to two large government-run cash transfer programs.

Stoddard et al. (2017) investigate how the presence of violence affects humanitarian activities among conflict affected populations in Afghanistan, Somalia, South Sudan and Syria. They conclude that insecurity decreases humanitarian aid coverage, measured as the numbers of organizations, projects and personnel at the subnational level given the level of need. Finally, Maiden and Brockway (2018) analyze the targeting of aid during conflict using village and household level survey data from northern Mali. They find that agricultural aid distributed by NGOs in conflict prone areas of northern Mali is not necessarily reaching those most in need and that the political connections of local elected leaders matter.

We add to this literature by estimating the village-level coverage of various forms of aid based on pre-conflict village characteristics and on conflict, both in terms of presence of armed groups and conflict-related violence.

The main message of the paper is that conflict is multifaceted. Surprisingly, there is no statistical relationship between presence of armed groups and the intensity of local conflict-related violence. Moreover, village-level characteristics associated with the presence of armed groups only partly overlap with those associated with conflict intensity. Both dimensions of conflict are positively associated with ethnic diversity, with assets ownership and with agricultural development. Higher levels of household welfare protect villages against the presence of armed groups but not against higher conflict intensity. We find further that at village-level, the mechanisms through which conflict potentially affects human capital vary by the dimension of conflict exposure considered. Presence of armed groups is associated with more local crime (especially cattle theft), more mobility restriction and less trust while conflict intensity is associated with more service disruption and less trust. Finally, we find that the dimensions of conflict exert an *opposite* effect on aid coverage. While the presence of armed groups tends to strongly restrict access to aid, the coverage of aid tends to increase with local conflict-related violence. This suggests that aid actors proactively attempt to target conflict areas but that the entrenched presence of non-state actors undermines their access. Taken together, these results show that armed conflicts are complex and nuanced phenomena, which cannot be reduced to a single dimension when designing development, humanitarian and security policies.

The remainder of the paper is organized as follows. Section 2 provides an overview on the data we used and on the conflict dynamics in Mopti since 2012. Section 3 investigates the pre-conflict characteristics associated with the subsequent presence of armed groups and intensity of conflict-related violence. Section 4 is devoted to the analysis of the correlations between the dimensions of conflict and a range of local potential consequences of conflict. Section 5 presents the analysis of the role of conflict on the access to aid. Section 6 discusses findings and concludes.

2. Data sources and overview of the conflict in Mopti since 2012

2.1. Data sources

This paper draws from a unique panel dataset of households across 66 villages in Mopti.[1] Two rounds of surveys were collected. The baseline was implemented in January 2012, three months before the coup and the onset of the high intensity armed conflict in northern Mali. The follow up survey was implemented in the same communities in January 2017.

The baseline survey was implemented as part of an impact evaluation of a home-grown school feeding program across Mali (Masset and Gelli 2013), involving close to 2000 households in the Mopti region. The survey included wide-ranging information on agriculture and production, consumption, food security and socioeconomic status, children's anthropometry, education and labor force participation etc. The follow-up survey was implemented in the Mopti region only, and included most of the same questions as for the baseline. In addition, detailed modules were added to measure exposure to conflict and to aid. We asked community leaders questions about the presence of armed groups in the village (precise timeline of events), the behaviors of these groups, and the amount of disruption of service and destruction of facilities. Household respondents were asked about local crime and violence, whether they reduced their traveling to various places because of fear, and questions related to social capital in the village.

Additionally, we used external data from ACLED and UCDP/GED to map the location of conflict events and calculate distances between each village in the sample and the location of each conflict events. Based on this information, we calculated the number of events and the total number of conflict-related fatalities within a radius of 10 kilometers around the village. The choice of a radius is arbitrary, but we believe that 10km allows for a measure of violence that is local while not generating a variable that is too skewed (with many zeros in the distribution). Using a broader radius, such as 50 kilometers as in Wagner et al. (2018), would automatically weaken the relationship between village characteristics and the variable of violence intensity as the latter would not as "local" anymore.

2.2. Brief description of Mopti

The Mopti region is located in Central Mali. The region borders the Timbuktu region to the north, the Segou region to the West and Burkina-Faso to the South and South-East. It covers 79,017 km² and was home to 2 million people in 2009 (last census year). The Inland Niger Delta – in the center of the region – is a fertile ground for farming. Mopti produces 40% of the country's rice and 20% of its millet and sorghum. The region is also the largest source of livestock in the country (ICG 2016).

[1] 4 villages could not be re-surveyed at follow-up, due to the conflict situation.

According the 2009 census, the Dogon was the largest ethnic group, with 42% of the population. The Dogons are primarily farmers (ICG 2016). The Peulhs (or Fulani) constituted the second largest ethnic group, with 27% of the population. Although we usually associated Peulhs with cattle herding, including with the practice of cattle theft - not all Peulhs in Mopti are pastoralists.

2.3. Timeline of the conflict

Mali has witnessed 4 Tuareg rebellions since independence: in 1963, 1990, 2006 and 2012. Prior to the one in 2012, none of these rebellions reached central Mali. The latest rebellion started in January 2012 when a Tuareg rebel group (the *Mouvement de Liberation de l'Azawad*, MNLA) and three jihadist groups (Al-Qaeda in Islamic Maghreb, AQIM, Ansar Dine and MUJAO) attacked Malian security forces in northern Mali.[2] Attacks by the MNLA and its allies drove the state away from northern towns and on 6 April 2012, the MNLA declared the independence of the Azawad (i.e. the Tuareg-dominated, northern regions of Mali). The succession of military defeats from the Malian army led to protests, an army mutiny and eventually a coup on 21 March 2012.

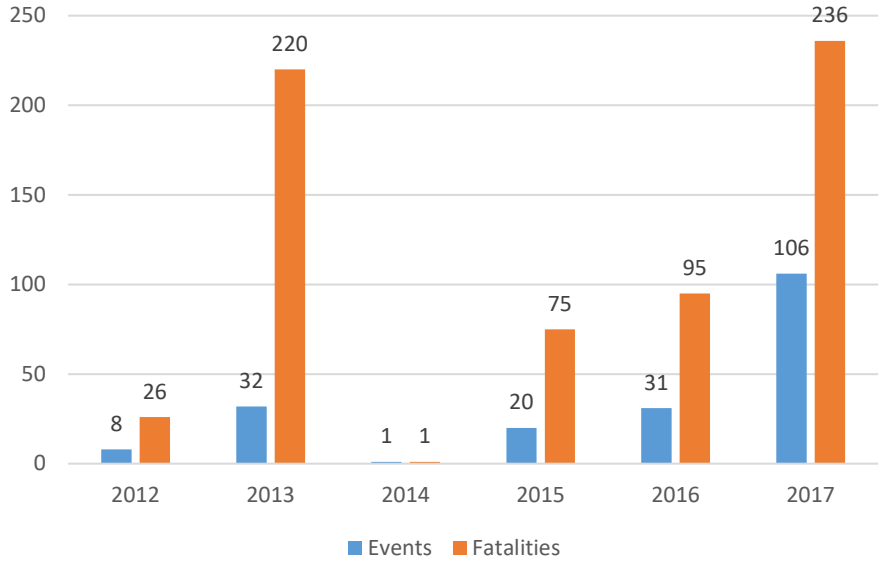
The MNLA and the Islamist[3] groups progressed southwards into Mopti region.[4] On the 8th of January 2013, these groups reached Kona, just 60 km north of Mopti city, the headquarter of the region. This eventually triggered the French military operation Serval which stopped the advance of Islamist groups and chased them out from Mopti (Ba and Boas 2017). During the period between January 2012 and April 2013, the MNLA and jihadist groups largely occupied the Douentza *cercle* (the cercle is an administrative sub-division) and urban centers along the Mopti-Gao road (ICG 2016). The advance of rebels also caused state personnel and officials to flee the region (ICG 2016).

The period between April 2013 – following the defeat of rebels in Mopti - and the beginning of the year 2015 was largely free of conflict, and the Malian state attempted to re-establish its authority. From 2015 onwards, however, Mopti was affected by a resurgence of violence. This violence has been intensifying every year so that the conflict crisis is now no longer seen as circumscribed to the north of Mali. On the contrary, the worst violence during the municipal elections of 2016 took place in Mopti and the situation in central Mali is currently the subject of much political, journalistic and scholarly attention (ICG 2016, Sangare 2016).

We use the ACLED dataset to glean information on the intensity and actors of the conflict in Mopti. We restricted the analysis to the period 2012-20-17 as it corresponds to the dates of the household data collection. Figure 1 confirms the timeline of events just described. We can identify the 2012-2013 period, in which 40 conflict events took place, the year 2014, in which conflict was virtually absent, and the period 2015-2017 which sees increasing levels of violence. The number of violent events in 2017 were more than three time as much as the number of events in 2013. Fatalities have also been increasing and the year 2017 was even more deadly than the year 2013, although the latter witnessed large-scale military operations against the Islamist groups in Mopti.

[2] The MNLA was founded in 2010 but only attacked in early 2012, primarily because of the return of Tuareg combatants from Libya (Ba and Boas 2017).
[3] With a slight abuse of language, we will use Islamist and jihadist groups interchangeably.
[4] Meanwhile, the MNLA found itself out-manoeuvred by its allies and ousted from the northern towns by the jihadist groups (Ba and Boas 2017).

Figure 1 Intensity of the conflict in Mopti region, 2012-2017



Note: authors' calculations based on ACLED data.

2.4. Conflict dynamics in Mopti

From a political economy perspective, the two periods of the conflict (2012-13 and 2015-17) are characterized by fairly different dynamics. The first period primarily involved the MNLA and Islamist groups on the one hand, and military forces (from Mali and France) or civilians on the other hand. ACLED data suggest that 28 out of the 40 events of the period 2012-14 involved interactions between the rebel groups, the army and the civilians. Seven of the remaining 12 events were acts of violence against civilians by security forces.

The second period saw the increasing role of militias (political or identity-based). Indeed, 71 out of the 157 violent events of the 2015-17 period involved militias whereas rebel groups were "only" involved in 36 events. The conflict in Mopti since 2015 can no longer be summarized as primarily driven by Tuareg rebels and jihadist groups. Instead, the conflict became more complex as it intensified, and it is not easy to disentangle various forms or motives of collective violence. On the one hand, jihadist violence continued to exist in Mopti, notably since the establishment in 2015 of the Front de Liberation du Macina (FLM) by Amadou Koffa, a Mopti-based preacher who was previously in Ansar Dine. On the other hand, some scholars dispute the pure jihadist motive of Islamist groups and note that the boundaries between banditry and jihadism are blurred at best (ICG 2016).[5] [6]

Furthermore, Mopti has been home to other forms of collective violence, especially in relation with communal clashes (e.g. Dogon farmers vs Peulh herders; Peulhs herders vs Tuaregs herders) and with land- and resources-based conflicts (pitting farmers against herders over grazing land, or herders against

[5] HRW (2016) quotes a Dogon farmer saying: "Honestly, Islamist, bandit, we can't tell the difference." (p. 6) whereas a Dogon leader stated that:" Yes, the jihadists are in our zone, but the situation is very complex: an Islamist can also be a bandit, and a bandit a jihadist" (p. 8).

[6] Sangare (2016) even disputes the importance of the FLM and claims that local banditry groups are likely responsible for the brunt of attacks assigned to the FLM by security forces. In any case, Sangare's point further reinforce the notion of blurred boundaries between Islamist groups and banditry.

each other for water). The picture is made even more complex as the recruitment into Islamist groups appears to have been substantially drawn from ethnic Peulhs (HRW 2016, Guichaoua and Pellerin 2017, Sangare 2016) and because livelihood and ethnicity markers partly overlap. Hence while most Dogon and Bambara are farmers, not all Peulhs are herders (although a substantial minority is). ICG (2016) and Sangare (2016), among others, note that jihadism has often become a pretext to deal with other -local – grievances.

The jihadist violence has also fueled other forms of violence. For instance, the Peulhs of Mopti have historically considered that the Tuaregs were favored in the peace accords of 1992. When Tuaregs advanced in Mopti with the MNLA, many Peulhs joined Islamist groups (especially Ansar Dine, see ICG 2016, Sangare 2016) as a way to protect themselves from the Tuaregs and to obtain weaponry.[7] When the state drove back the Tuareg rebels and the jihadists from Mopti in 2013, Peulhs were widely suspected of collaboration with these groups and severe human rights violations at the end of the police ensued (ICG 2016, HRW 2016). This further disenfranchised the Peulhs and pushed them to mount self-defense militias.

The context of a largely absent, ineffective and even corrupt state also shaped the conflict dynamics. For instance, as communities did not trust the state could protect them (or, as in the case of the Peulhs, did not trust that the state wished to protect them), community-based militias emerged and gained in importance. One of the most violent episodes in Mopti was the killings of 16 Peulhs herders by the Dozos, a Dogon militia (ICG 2016). It should also be noted that the previous Tuareg rebellions, if they did not directly affect Mopti, led to an increase in the availability of weapons (including AK-47) in the region, which fueled banditry and insecurity (HRW 2016). Some Mopti resident seemed to have welcome the order brought by the Islamist groups when they occupied Douentza *cercle* for that reason (HRW 2016).

In summary, the situation in Mopti results from a complex interplay between communal relations, state-periphery relations, state presence, rebels' behaviors, international jihadism, economic vulnerability etc. This discussion emphasized four broad factors of conflict that we can measure in our dataset. First service provision, as militias and rebel groups directly and indirectly stem from the absence of the state. Second, ethnic composition of villages, as communal tensions feature heavily in the conflict landscape and because of the ethnic recruitment into Islamist groups. Third, agricultural development and importance of herding, as the clashes between herders and farmers are a prominent source of violence. Fourth, human development and household welfare as promoting populations welfare discourages young people to joining armed groups and detracts from the formation of deep-rooted grievances.

2.5. Conflict in the sample of 66 villages

Our sample in Mopti covers 4 of the 8 administrative sub-divisions (*cercles*): Mopti, Bandiagara, Koro and Douentza. The cercles of Youvarou and Tenenko (in the West), Djenne (South West) and Bankass (South) were not included in the baseline survey in 2012. The administrative map of Mopti region is displayed in Figure 2. According to ACLED, over the period 2012-2014, out of the 51 conflict-related events that occurred in the whole of Mopti region, 46 took place in the 4 *cercles* included in the sample. These 46 events were responsible for 219 fatalities out of the 259 fatalities that happened in the whole of Mopti between 2012-2014.

[7] Of course, this does not preclude the fact that some Peulhs also joined out of ideological motives.

Figure 2 Administrative map of Mopti region

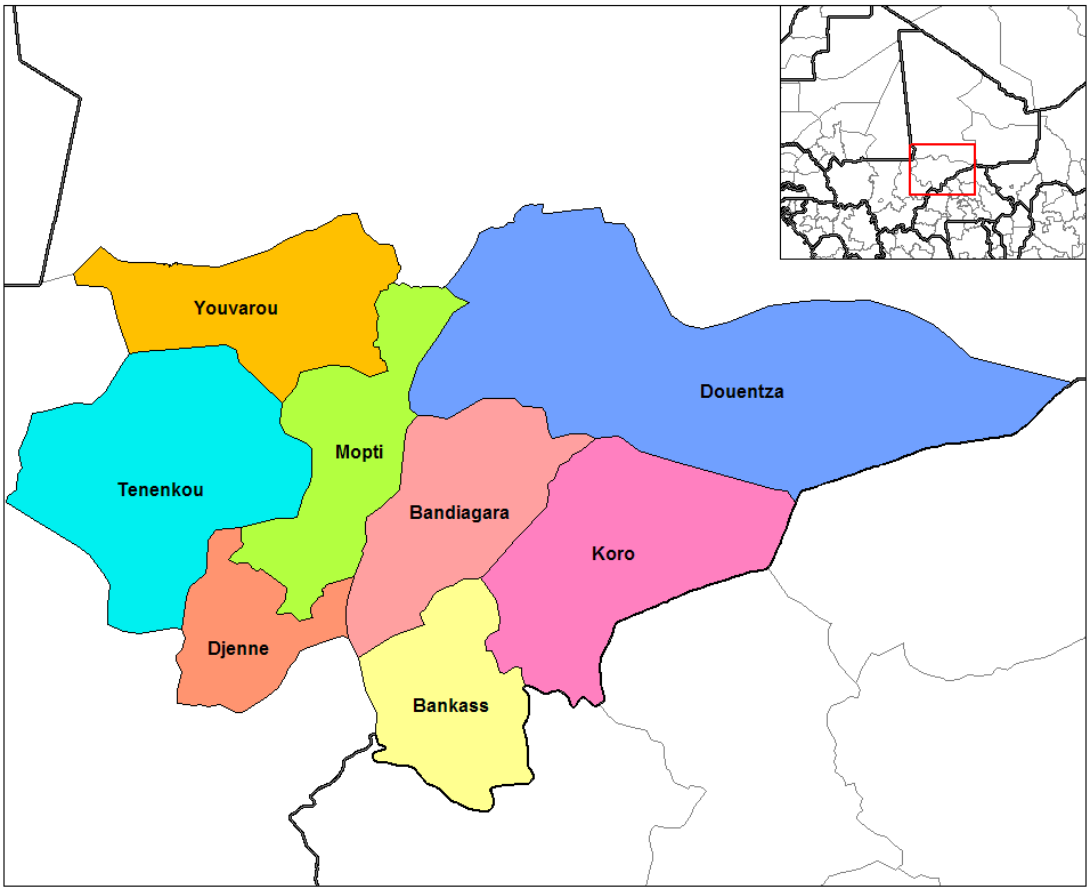


Table 1 Presence of armed groups and conflict-related violence in Mopti's cercles

Cercle	Mopti	Bandiagara	Koro	Douentza
Panel A: Period: 2012-2014				
Number of villages where armed groups were reported/Number of villages in sample	0/2	0/30	2/16	5/16
Proportion of villages in *cercle* where armed groups were reported	0%	0%	13%	31%
Conflict-related events	29	0	3	13
Fatalities	191	0	25	3

Panel B: Period 2012-2017				
Number of villages where armed groups were reported/Number of villages in sample	1/2	0/30	4/16	5/16
Proportion of villages in *cercle* where armed groups were reported between 2012 and 2014	50%	0%	25%	31%
Conflict-related events	44	7	25	84
Fatalities	231	12	130	159

Note: Information on presence of armed groups comes from the household survey collected in 2017. Information on conflict-related violence comes from ACLED dataset.

We use information from community leaders' interview to ascertain which villages were affected by the presence of armed groups. Ten villages out of 66 were affected at any point over the 2012-17 period. Three villages reported the presence of the MUJAO, three villages reported the presence of Ansar Dine, one village reported the presence of the MNLA, one village reported the presence of AQIM and five villages reported the presence of unnamed bandit groups. These results show that villages were often in contact with multiple armed groups over the study period. Armed groups did not seem to have established sophisticated local governance and no village leaders reported that groups engaged in local service provision. However, village leaders reported that these groups often wished to enforce the Islamic law.

Information displayed in Table 1 shows that 7 out of 64 villages in the sample were occupied by an armed group between 2012 and 2014. Douentza circle was the most affected with 5 villages where armed groups were present, representing almost 1 in 3 villages in this subdivision. In Koro circle, 2 villages out of 16 were occupied, whereas no villages in Mopti and Bandiagara villages were directly affected by armed groups.

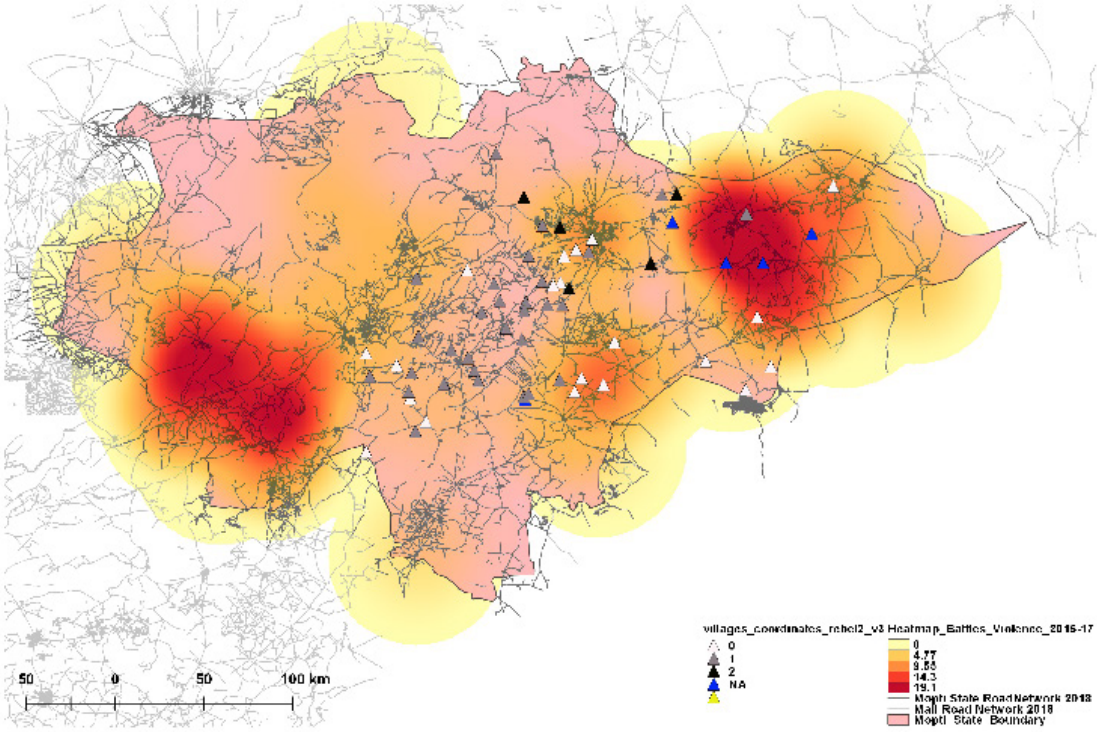
Table 1 also shows that there is not a close correspondence between the proportion of villages directly affected by armed groups in each *cercle* and the intensity of the conflict – as measured by number of conflict-related events and fatalities. Although Bandiagara which was spared by armed groups did not witness conflict-related violence between 2012 and 2014, Douentza, which was severely affected by the presence of armed groups, only witnessed low intensity violence (13 events for 3 fatalities overall) and Mopti, which was not affected by presence of armed groups, witnessed large-scale violence over 2012-2014 (29 events for 191 fatalities overall).

The lack of correspondence between presence of armed groups and intensity of violence can partly be explained by the dynamics of the conflict. Indeed, it is in Mopti *cercle* (locality of Kona) that the largest battle between the French and Malian military forces, and Ansar Dinne took place on 12 January 2013. This battle was responsible for 111 fatalities alone. It is also in Mopti cercle that the most important events of violence against civilians occurred in January 2013, causing 46 fatalities in the locality of

Sevare. In contrast, Douentza circle (and to a lower extent, Koro circle) were occupied by armed groups but were not home of large-scale military operations over the 2012-2014 period.

The lack of correspondence is even more visible in Figure 3 which overlays the location of villages on the heatmap of violence intensity. Black triangles denote villages in which armed groups were present and we can see that they appear at various levels of conflict intensity on the map.

Figure 3 Location of armed groups and heatmap of conflict intensity



Note: each triangle represents a sampled village.

Table 1 also highlights that the dynamics of conflict-related violence and presence of armed groups markedly changed over the 2012-2014 and 2015-2017 sub-periods. On the one hand, the presence of armed groups was a persistent phenomenon as nearly all villages which suffered from the presence of armed groups in the initial period continued to be affected in the 2015-17 subperiod. One village in Mopti, and two villages in Koro became exposed to armed groups over the 2015-17 period whereas 6 out of the 7 villages that were directly affected in 2012-2014 were still affected over 2015-17. Overall, 10 villages ever experienced the presence of an armed group between 2012-2014 and 9 of these villages were still affected in 2017.

Conflict-related violence, in contrast, markedly changed across the two periods. Violence surged in Douentza and Koro circles in 2015-2017 where 71 and 22 events took place, against 13 and 3 over 2012-2014, respectively. In Mopti, violence continued but on a lower scale than in the initial period (15 events for 40 fatalities over 2015-17 against 29 events for 191 fatalities in the initial period). Finally, Bandiagara

remained the least affected circle although 7 conflict-related events took place after 2015, for 12 fatalities.

Overall, we can see that one *cercle* was largely unaffected by the presence of armed groups and conflict-related violence (Bandiagara). Douentza and Koro were both heavily affected by presence of armed groups throughout the period and by large-scale violence since 2015. And Mopti was heavily affected by conflict-related violence before 2014 even though violence continued after 2015.

3. Determinants of the armed conflict in Mopti

In this section, we investigate which pre-conflict characteristics of village are associated with subsequent conflict. We start by looking at the presence of armed groups before looking at conflict intensity.

3.1. What explains the presence of armed groups in villages between 2012-2017?

Our dataset allows us to explore four broad set of characteristics to explain the presence of armed groups: service provision, agricultural development, household welfare, and ethnic composition of villages. All these variables are measured before the onset of the armed conflict in January 2012.

Service provision includes variables on the presence of primary and secondary schools and of markets within close proximity of the village, and the extent of service provision at baseline (as retrieved from interviews with community leaders). Agricultural development is measured by the average land size, sales and livestock ownership (measured as tropical livestock units, TLU). Household welfare is proxied by average levels of food consumption (in kg per adult equivalent), dietary diversity score, and asset ownership. Finally, the ethnic composition of villages is characterized by the ethnic fractionalization index and the proportion of Peulhs in the village.[8]

These four set of factors covers the most prominent explanation for the presence of armed groups summarized in section 2.4, i.e. absence of the state, the communal dynamics, the importance of livestock and agriculture, and human development.[9]

We estimate the likelihood that any armed group was present in village *j* in period *t+1* (i.e. 2012-2017) based on village characteristics in period *t* (i.e. in January 2012) through the following logistic model:

$$P\left(AG_{j,t+1}=1\right)=\Lambda[\beta_1 SP_{j,t}+\beta_2 A_{j,t}+\beta_3 W_{j,t}+\beta_4 ED_{j,t}+u_{j,t}] \quad (1)$$

Where $\Lambda(.)$ is the logistic function, $P\left(AG_{j,t+1}=1\right)$ is the likelihood that village *j* has experienced the presence of an armed group between 2012 and 2017, $SP_{j,t}$ is a vector of service provision variables, $A_{j,t}$ is a vector of agricultural variables, $W_{j,t}$ is a vector of village-level variables summarizing household welfare and $ED_{j,t}$ is a vector of variables describing the ethnic composition of villages. $u_{j,t}$ is the error term. All right-hand side variables are measured in period *t*, before the appearance of armed groups in

[8] We also calculated an ethnic polarization index which yielded similar results.
[9] We have also considered inequality within villages (measured by Gini coefficients of agriculture and welfare variables) but these variables proved to be mostly unrelated to conflict.

the Mopti region. The parameters of interest are $\beta_1, \beta_2, \beta_3$ and β_4 which inform us on which pre-conflict characteristics of villages are predictive of the subsequent presence of armed groups.[10]

Table 2 shows the results of logistic regressions of the presence of armed groups in villages between 2012 and 2017 on the pre-conflict characteristics of villages. Model (1) only includes service provision variables and no variables are significantly related to presence of armed groups. Model (2) considers variables describing the ethnic composition of villages. Neither the effects of ethnic fractionalization index nor the proportion of Peulhs are statistically significantly different from 0 at conventional levels.

Model (3) investigates the role of agricultural development. We find that armed groups are more likely to target villages with higher levels of livestock ownership. An increase in 1 standard deviation in mean livestock ownership (corresponding to 2.8 TLU) is associated with more than double the risk of armed groups being present in the village. Villages with higher agricultural production are also more likely to experience armed groups. A one standard deviation in value of agricultural production is associated with more than double (2.2) the risk of presence of armed groups.

Model (4) looks at the effect of household welfare. Mean levels of food consumption and dietary diversity scores are negatively associated with presence of armed groups but the effect of these variables fails to reach conventual statistical significance levels. In contrast, the mean level of asset ownership is positively associated with presence of armed groups, but here again the coefficient is not statistically different from 0.

Model (5) include all variables together. The mean level of TLU at village-level is positively associated with the presence of armed groups, and the effect is statistically significant at 5%. Similarly, villages with higher levels of asset ownership tend to be more likely to experience presence of armed groups. The effect is not very precisely estimated (it is significant at 10%) but it is very large in magnitude. A 1 standard deviation increase in the asset index is associated with a 7-fold increase in the risk of experiencing the presence of armed groups. Finally, mean levels of dietary diversity are negatively associated with armed groups presence ($p<0.1$). A 1 standard deviation increase in the dietary diversity score is associated with a reduction by three-quarter of the odds of armed groups presence.

Finally, model (6) uses a backward stepwise algorithm to select the independent variables (the criterion for variables to be retained in the model is that the p-value associated with the variable is lower than 0.2). We use a stepwise procedure as model (5) shows signs of overfitting, with some coefficients being very large. Model (6) yields similar results to model 5 except that the proportion of Peulhs and the mean level of agricultural production are now positively related to armed groups presence (with $p<.1$), and that the magnitude of the effect of asset index is reduced (but remains large).

Overall, Table 2 reveals that the presence of armed groups is not random. Armed groups were more likely to target villages with higher levels of agricultural development (production and livestock ownership) and with higher levels of assets ownership. This suggests that the choice of location of armed groups may have been driven by an opportunistic motive (i.e. looting and extortion). In contrast, there is also some evidence that villages with higher levels of human development (especially when measured by dietary diversity) have been less likely to experience armed groups presence. It is plausible that externally visible signs of economic development have attracted armed groups whereas less visible facets of economic development were protective. And there is a tendency for villages with higher

[10] We do not include sub-division (*cercle*) specific effects as we are primarily interested in the global risk factors, not in the risk factors within each subdivision. Furthermore, as there were no armed groups in Bandiagara, including *cercle* fixed effects result in a severe loss of sample size.

proportion of Peulhs to more be likely to attract armed groups, although this effect is only statistically significant in 1 of 3 models.

Table 2 Pre-Conflict Determinants of presence of armed groups in village between 2012-2017

Pre-conflict variables	Presence of armed groups in village between 2012 and 2017					
Estimator	Logit					
	(1)	(2)	(3)	(4)	(5)	(6)
Primary school within 1km	0.79				0.14	
	(0.96)				(0.35)	
Secondary school within 5km	0.69				0.65	
	(0.62)				(1.10)	
Market within 5km	0.52				0.86	
	(0.56)				(1.57)	
Number of services	1.44				1.11	
	(0.45)				(0.80)	
Ethnic Fractionalization		1.02			0.96	
		(0.018)			(0.039)	
Proportion of Peulh		1.02			1.03	1.03*
		(0.010)			(0.019)	(0.016)
Mean TLU			1.30**		1.44**	1.38**
			(0.16)		(0.25)	(0.21)
Mean land size			0.80		0.77	
			(0.28)		(0.45)	
Mean agricultural production			1.00*		1.00	1.00*
			(0.00)		(0.00)	(0.00)
Mean asset index				2.40	9.21*	6.03*
				(1.36)	(11.2)	(5.95)
Mean food consumption*				0.51	0.34	
				(0.34)	(0.42)	
Mean dietary diversity score				0.43	0.21*	0.22**
				(0.24)	(0.19)	(0.16)
Observations	64	64	64	64	64	64

*per adult equivalent

3.2. Determinants of local conflict-related violence intensity

We use the same strategy to estimate the determinants of intensity of local conflict-related violence, except that the dependent variable, $V_{j,t+1}$, is now a count variable:

$$V_{j,t+1} = \beta_1 SP_{j,t} + \beta_2 A_{j,t} + \beta_3 W_{j,t} + \beta_4 ED_{j,t} + \beta_5 AG_{j,t+1} + u_{j,t} \quad (2)$$

The dependent variable is the number of conflict-related fatalities within a 10-kilometer radius around each village. We used the negative binomial estimator to account for the fact that the number of fatalities is a count variable which displays very significant overdispersion (hence precluding the use of the Poisson estimator).

In Table 3, we show the result of estimating equation (2) with the negative binomial estimator. The list of independent variables for each specification is the same as in Table 2 with the addition of the presence of armed groups. We decided to include the presence of armed groups as a covariate in equation (2) because armed groups primarily came in the 2012-14 period whereas conflict-related violence mostly took place during the 2015-17 period. The coefficient associated with armed group presence displays a positive sign but is never statistically significant. Its inclusion in the regressions does not change the results. Results are also largely unchanged if we only consider conflict-related violence on the period 2015-17.

We can see that no variables in the first 3 models exert a statistically significant effect on conflict intensity. Model (4) shows that mean levels of asset ownership are positively and very strongly associated with conflict intensity. Model (5) shows that ethnic fractionalization fosters conflict intensity but the effect is not very precisely estimated ($p<0.1$) and the model shows clear signs of overfitting with some coefficients being very large. Our preferred model is thus model (6) which confirms that ethnic fractionalization and asset ownerships are positively associated with conflict-intensity. In contrast, the number of services available in the village at baseline exert a protective effect against the conflict. Every additional service reduces the number of fatalities in a 10km radius around the village by 2.

In summary, our results show that conflict intensity is unrelated to the presence of armed groups but is positively associated with average levels of asset ownership and by ethnic fractionalization, whereas presence of services in the village is associated with lower conflict intensity. The village characteristics associated with conflict intensity are therefore not too dissimilar from those of presence of armed groups. Specifically, ethnic diversity and assets ownership are predictors of both presence of armed groups and conflict intensity. In contrast, mean levels of household welfare and agricultural development are not associated with subsequent conflict intensity as were with presence of armed groups, and availability of services is associated with conflict intensity but not with the presence of armed groups.

Results with number of events – as opposed to fatalities – and on the 2015-2017 sub-period yield qualitatively similar results. We also used a conditional negative binomial estimator to account for circle specific effects tend to reinforce, which gave very similar results.

Table 3 Pre-Conflict Determinants of Intensity of Conflict-Related Violence in the immediate vicinity of villages

Pre-conflict variables	Number of conflict-related fatalities within 10km of village					
Estimator	Negative Binomial Estimator					
	(1)	(2)	(3)	(4)	(5)	(6)
Armed groups present	1.72	2.80	7.94	1.88	35.9	
	(2.96)	(4.84)	(45.4)	(4.65)	(139.2)	
Primary school within 1km	.				.	
	(.)				(.)	
Secondary school within 5km	0.22				0.02	
	(0.44)				(0.08)	

Market within 5km	3.76				90.85	
	(8.32)				(329.4)	
Number of services	0.49				0.27	0.13*
	(0.41)				(0.40)	(0.16)
Ethnic Fractionalization		1.05			1.14*	1.11*
		(0.05)			(0.09)	(0.06)
Proportion of Peulh		0.96			0.95	
		(0.04)			(0.05)	
Mean TLU			1.19		0.94	
			(0.42)		(0.47)	
Mean land size			1.47		0.18	
			(1.46)		(0.26)	
Mean agricultural production			1.00		1.00	
			(0.001)		(0.001)	
Mean asset index				18.35*	79.70	9.48**
				(32.16)	(240.1)	(10.34)
Mean food consumption*				0.11	0.21	
				(0.20)	(0.38)	
Mean dietary diversity score				0.24	0.34	
				(0.30)	(0.60)	
Observations	64	64	64	64	64	64

Exponentiated coefficients; Standard errors in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

4. Local Consequences of Conflict and Violence

Armed conflict and violence exert an effect on households, markets, society and institutions that goes beyond the direct effect of killings and injuries. For instance, Degomme show that excess mortality due to armed conflict is primarily related to collapse of health systems and increase in malnutrition rather than to battles. Armed conflicts have the potential to cause disruption in the functioning of markets, strain communities, weaken governance – even at relatively low levels of intensity. Tranchant et al. (2014) show that households could not cope with droughts in conflict-affected contexts, causing devastating increase in malnutrition among children. Justino (2012) develops a systematic framework linking armed conflict and household welfare through a variety of channels (e.g. demographic change, coping mechanisms, institutional change, fear and trauma, social capital).

In this section, we attempt to document some of these channels and assess whether they have been activated in the context of Mopti. Furthermore, we attempt to disentangle the effect of conflict that stems from the presence of armed groups from that resulting from the intensity (and proximity) of violence. Through the follow-up household survey completed in 2017, information was available on (i) insecurity and local violence, (ii) fear and restriction on the mobility of households, (iii) social capital, (iv) disruption of services, and (v) access to aid. As access to aid is a primary goal of the paper, we will look at it separately in section 5.

To measure local insecurity and local conflict-related violence, we constructed indices of *village-level insecurity* and *village-level conflict-related violence* from household survey respondents' answers. We asked respondents whether a number of acts of conflict and violence happened in their village in the

last 4 years, and the indices simply sum the number of acts that happened (the maximum for the violence index is 13).[11] Among the non-conflict violence, theft of livestock is by far the most common occurrence, as it is reported by 60% of respondents. We considered violence to be conflict-related in the case of banditry, terrorism/armed attacks, political violence, kidnapping, and violence/lynching due to armed group. The index of conflict-related violence in this case has a theoretical maximum of 5.

To measure fear and *restriction on peoples' mobility*, we asked respondents questions on whether they reduced their travels to a range of places because of fear. These included trips to the health center, to the market (for buying and for selling), to NGOs, to local administrations, to schools (for their children) etc.

To measure social capital, we asked respondents whether people in their community could be trusted. We created a binary variable of *trust* that takes the value 1 when respondents answered that "people can be very trusted" and "people can be somewhat trusted" and 0 otherwise. We also asked how frequently people in the community discuss problems with each other how frequently people in the community help each other out. We crated binary variables *discuss* and *help* using the same approach and ("very frequently" and "somewhat frequently" were coded as 1).

To measure *service disruption*, we asked community leaders whether services that were present at baseline ceased to function or were disrupted over the period 2012-2017. Most disruptions concerned schools (as the range of other services available at baseline was very limited) so we generated a binary variable taking the value 1 if at least one service was disrupted or stopped functioning between 2012 and 2017.

1.1. Bivariate analysis

In Table 4, we present the results of bivariate association between these village-level variables and our two conflict descriptors (presence of armed groups, and local conflict-related intensity). We dichotomized the variable of fatalities for the sake of this analysis.

We found that the mean of the village-level insecurity index was 2 in villages affected by armed groups against 1.1 in other villages and that the mean of the conflict-related violence index was 0.7 in villages directly affected by armed groups against 0.2 in villages unaffected. Both differences were highly statistically significant.[12] In contrast, the differences in means were less marked and not statistically significant when we used fatalities to describe the conflict.

The mean of the index of mobility restriction is very high as people on average report reducing their travels to almost 3 different places due to fear. This index reaches a mean of 4 in villages in the vicinity of whose fatalities were present and of 5 where armed groups were present. In both cases, the differences

[11] We also calculated indices based on the reported frequency of these acts, which gave the same results.

[12] Among the non-conflict violence, theft of livestock is by far the most common occurrence, as it is reported by 60% of respondents. This proportion is markedly higher in villages affected by armed groups (73%) than in villages unaffected (56%). We find the same pattern when we look at frequency of theft. Whereas 92% of respondents in villages where armed groups were present report that theft of livestock was occasional or frequent, the proportion falls to 62% in villages where armed groups were absent.

in means are statistically significant (but especially so when conflict is measured by presence of armed groups).

We find high levels of social capital. 92% of respondents trust people in their community, 90% of respondents consider that people discuss problems with each other, and 85% of respondents consider that people help each other out. Both the average levels of trust and of help are significantly lower in conflict-affected villages. This is true – in roughly the same proportion - when we operationalize conflict with presence of armed groups or with the presence of fatalities.

Table 4 Bivariate associations between presence of armed groups and conflict-related violence; and village-level indicators

		Armed groups were present in village between 2012 and 2017			Conflict-related Fatalities within 10km of village between 2012 and 2017		
		Yes	No		Yes	No	
	Sample Mean	Mean	Mean	Difference (p-value)	Mean	Mean	Difference (p-value)
Village Insecurity index	1.22	1.99	1.07	0.92*** (0.00)	1.61	1.19	0.41 (0.15)
Village conflict-related violence index	0.30	0.73	0.22	0.51*** (0.00)	0.28	0.32	-0.04 (0.78)
Mobility restriction index	2.98	4.96	2.66	2.3*** (0.00)	4.18	2.79	1.39* (0.06)
Trust	0.92	0.83	0.93	-0.10** (0.02)	0.80	0.93	-0.13*** (0.002)
Discuss	0.91	0.88	0.91	-0.03 (0.30)	0.87	0.91	-0.05 (0.17)
Help	0.85	0.79	0.87	-0.08* (0.06)	0.79	0.86	-0.07* (0.1)
Service disruption	0.30	0.50	0.26	0.24 (0.13)	0.67	0.23	0.44*** (0.01)
N	66	10	56		9	57	

Note: authors' calculations.

1.2. Multivariate analysis

Unfortunately, we do not have baseline values for these variables so we cannot document how they evolved following the conflict. Thus, this analysis is purely correlational. Indeed, we cannot rule out that e.g. the lower trust observed in conflict-affected villages was already present prior to the conflict and is a cause rather than a consequence of the conflict.

We can, however, refine the analysis by conducting multivariate regressions that include the baseline values of the key village characteristics we used in section 3. In so doing, we can assess whether the strong relationships of Table 4 resist when predictors of conflict are accounted for.

Table 5 reports OLS estimations of village-level potential consequences of conflict on presence of armed groups and number of fatalities. The first specification for each dependent variable only includes these two covariates and the second specification adds the covariates of equation (1), i.e. service provision, ethnic composition, agricultural development and household welfare. We can see that introducing presence of armed groups and number of fatalities together does not change much the insights from the bivariate analysis. The presence of armed groups is associated with more insecurity, more village-level violence, and reduced social capital. The number of fatalities is weakly associated with service disruption and reduced trust. When we include the full range of controls, we see that the association between the presence of armed groups and insecurity decreases in magnitude and cease to be statistically significant. The association between presence of armed groups and local conflict-related violence also decrease in magnitude but remains statistically significant. In contrast, the relationships between presence of armed groups and reduced trust and between fatalities and service disruption are unaffected. These results suggest that the correlation between presence of armed groups and local insecurity was largely spurious in that the processes leading to the presence of armed groups and the processes leading to local insecurity are the same. Indeed, the most significant predictors of local violence are the proportion of Peulhs and the value of agricultural production. When we control for these factors, the relationship between presence of armed groups and insecurity disappears. However, the fact that the other correlations remain statistically significant even after controlling for the determinants of conflict suggest that local violence, reduced trust and service disruption are plausible pathways through which the armed conflict in Mopti adversely affect peoples.

In Table 6, we replicate the same analysis, but we now introduce *cercle* dummies to account for cercle specific fixed effects. The results are fairly similar to those of Table 5 except that fatalities are now significantly associated with lower social capital.

Table 5 Presence of armed groups, conflict-related intensity and village-level consequences. OLS estimations

	(1) Village Violence intensity index	(2) Village Violence intensity index	(3) Village Conflict-Violence intensity index	(4) Village Conflict-Violence intensity index	(5) Trust	(6) Trust	(7) Discuss	(8) Discuss	(9) Help	(10) Help	(11) Service disruption	(12) Service disruption
Armed groups present	0.90***	0.23	0.51***	0.20*	-0.096**	-0.11**	-0.029	-0.018	-0.077*	-0.085*	0.96	1.41
	(0.25)	(0.24)	(0.12)	(0.12)	(0.041)	(0.043)	(0.032)	(0.040)	(0.043)	(0.048)	(0.74)	(1.05)
Fatalities within 10k	0.010	0.012	-0.0021	0.00081	-0.0037	-0.0024	-0.0027	-0.0033	-0.0021	-0.0038	0.10*	0.12*
	(0.017)	(0.014)	(0.0080)	(0.0072)	(0.0027)	(0.0026)	(0.0022)	(0.0024)	(0.0028)	(0.0029)	(0.058)	(0.069)
Primary school < 1km		0.18		-0.018		-0.11**		-0.053		-0.030		-0.89
		(0.28)		(0.14)		(0.051)		(0.048)		(0.057)		(1.42)
Secondary school <5km		0.032		-0.027		0.038		0.022		0.00		0.59
		(0.21)		(0.10)		(0.037)		(0.035)		(0.042)		(0.93)
Market within 5km		-0.039		0.023		-0.0049		-0.056		-0.0088		-0.31
		(0.20)		(0.10)		(0.037)		(0.034)		(0.041)		(0.89)
Number of services		-0.020		0.038		0.0088		0.013		0.015		0.34
		(0.082)		(0.041)		(0.015)		(0.014)		(0.017)		(0.39)
Ethnic Fractionalization		0.26		-0.37		-0.040		-0.012		-0.045		4.48*
		(0.58)		(0.29)		(0.11)		(0.098)		(0.12)		(2.62)
Proportion of Peulh		0.016***		0.0082***		-0.00		-0.00043		-0.001		0.0045
		(0.0034)		(0.0017)		(0.001)		(0.00057)		(0.001)		(0.015)
Mean TLU		0.019		0.010		-0.00		0.0020		0.0086		-0.21
		(0.028)		(0.014)		(0.005)		(0.0047)		(0.0056)		(0.15)
Mean land size		-0.10		-0.056		0.0012		0.0096		0.012		-0.100
		(0.069)		(0.034)		(0.012)		(0.012)		(0.014)		(0.34)
Mean ag. production		0.24***		0.056		-0.023		-0.022		-0.047***		-0.26
		(0.084)		(0.042)		(0.015)		(0.014)		(0.017)		(0.41)
Mean asset index		0.48***		0.20***		0.0069		-0.0071		0.0028		0.41
		(0.11)		(0.057)		(0.021)		(0.019)		(0.023)		(0.59)
Mean food Cons.*		-0.095		-0.041		0.0081		0.00065		-0.016		0.45
		(0.083)		(0.042)		(0.015)		(0.014)		(0.017)		(0.37)
Mean dietary diversity		-0.15		-0.15***		-0.069***		0.0090		-0.032		0.035
		(0.10)		(0.051)		(0.019)		(0.017)		(0.021)		(0.48)
Observations	64	64	64	64	64	64	64	64	64	64	64	64
R2	0.19	0.60	0.23	0.59	0.12	0.45	0.043	0.18	0.065	0.34		

Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 6 Presence of armed groups, conflict-related intensity and village-level consequences. Cercle fixed effects estimations

	(1) Village Violence intensity index	(2) Village Violence intensity index	(3) Village Conflict-Violence intensity index	(4) Village Conflict-Violence intensity index	(5) Trust	(6) Trust	(7) Discuss	(8) Discuss	(9) Help	(10) Help	(11) Service disruption	(12) Service disruption
Armed groups present	0.59**	0.083	0.40***	0.16	-0.079**	-0.088**	-0.015	-0.0063	-0.071*	-0.075	-0.022	0.66
	(0.26)	(0.24)	(0.12)	(0.12)	(0.034)	(0.039)	(0.036)	(0.042)	(0.042)	(0.048)	(0.80)	(1.15)
Fatalities within 10k	-0.00	0.004	-0.01	-0.005	-0.005**	-0.0042*	-0.002	-0.0028	-0.004	-0.006*	0.072	0.059
	(0.02)	(0.02)	(0.01)	(0.007)	(0.002)	(0.0024)	(0.002)	(0.0026)	(0.003)	(0.003)	(0.056)	(0.071)
Primary school < 1km		0.020		-0.054		-0.074		-0.038		-0.011		-1.75
		(0.28)		(0.14)		(0.046)		(0.050)		(0.058)		(1.54)
Secondary school <5km		0.044		-0.025		0.032		0.021		-0.0031		0.45
		(0.20)		(0.10)		(0.033)		(0.036)		(0.041)		(1.01)
Market within 5km		0.043		0.048		-0.018		-0.063*		-0.014		-0.30
		(0.20)		(0.099)		(0.032)		(0.035)		(0.040)		(1.08)
Number of services		0.071		0.076		-0.0032		0.0052		0.013		0.59
		(0.095)		(0.047)		(0.015)		(0.017)		(0.019)		(0.61)
Ethnic Fractionalization		0.48		-0.24		-0.044		-0.029		-0.032		4.47
		(0.58)		(0.29)		(0.095)		(0.10)		(0.12)		(3.07)
Proportion of Peulh		0.015***		0.0076***		-0.00		-0.00		-0.0012*		-0.005
		(0.0033)		(0.0017)		(0.001)		(0.001)		(0.001)		(0.02)
Mean TLU		0.015		0.0056		-0.0021		0.0022		0.0070		-0.24
		(0.027)		(0.014)		(0.0044)		(0.0048)		(0.0055)		(0.16)
Mean land size		-0.072		-0.046		-0.0049		0.0069		0.0100		-0.018
		(0.068)		(0.034)		(0.011)		(0.012)		(0.014)		(0.40)
Mean ag. production		0.22**		0.076*		0.00038		-0.019		-0.030*		-0.14
		(0.088)		(0.044)		(0.014)		(0.016)		(0.018)		(0.46)
Mean asset index		0.44***		0.20***		0.024		-0.0032		0.013		0.25
		(0.11)		(0.057)		(0.018)		(0.020)		(0.023)		(0.58)
Mean food Cons.*		-0.12		-0.050		0.013		0.0029		-0.015		0.48
		(0.082)		(0.041)		(0.013)		(0.015)		(0.017)		(0.48)
Mean dietary diversity		-0.16		-0.12**		-0.039**		0.011		-0.010		0.26
		(0.11)		(0.054)		(0.018)		(0.019)		(0.022)		(0.56)
Observations	64	64	64	64	64	64	64	64	64	64	62	62
R2	0.082	0.53	0.18	0.52	0.16	0.34	0.019	0.17	0.077	0.25		

Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

5. Conflict and access to aid in Mopti

5.1. Previous evidence

Maiden and Brockway (2018) analyze of the targeting of aid during conflict using village and household level survey data from Mali. They find that agricultural aid distributed by NGOs in conflict prone areas of northern Mali is not reaching those most in need. In contrast, aid is more likely to go to villages with a more politically or socially connected village leaders, irrespective of need. Political connection is defined by the ability and willingness of local officials to speak French during the survey. According to the authors, village leaders who prefer to communicate in French with international donors in northern Mali are more educated, wealthy, least likely to have attended a religious school, and are likely more closely aligned with the central government rather than with the jihadist groups.

In villages where officials speak French, the most vulnerable households are not guaranteed to receive agricultural aid while in other villages aid goes to households who are most in need (as measured by vulnerability to exogenous shocks). Controlling for the language of village leader shows that urban villages, villages farther from municipal centers, those that lack reliable transportation to the capital, and villages with large water stores are less likely to receive agricultural aid.

At the household level, environmental shocks appear to increase the likelihood of receiving agricultural aid. Vulnerability to economic shocks reduces the probability of receiving agricultural aid and the proximity to conflict appears to have a negative effect on aid reception in most specifications.

Tranchant et al. 2017 using the same household dataset as in the current paper estimate the likelihood for households to receive any food aid, General Food Distribution (GFD) and school feeding. They find that household-level variables have very little predictive power on the likelihood of receiving aid. Receipt of school feeding is more likely in villages with lower mean levels of socioeconomic status and the presence of armed groups tends to reduce likelihood to receive aid.

5.2. Aid coverage and conflict in Mopti

Table 7 provides information on the aid coverage over the period 2015-17 among households in our Mopti sample. Almost half of households received any type of aid between 2015 and 2017. This proportion ranges from 0% in 2 villages to 96% in 1 village. The most common form of aid is general food distribution (GFD), which was received by 22% of respondents. GFD was present in 56 of the 66 villages of the sample, and the maximum coverage in a given village was near universal (91% of respondents). The second most common form of aid was school feeding (SF), which was received by 14% of households. School feeding was present in fewer villages (42), and the maximum coverage did not exceed 59% of respondents in a given village.

Apart from food aid, 9% of households reported receiving veterinary services. Such services were delivered in over half the villages of the sample (35 out of 66) and maximum coverage did not exceed 38% of respondents. Provision of health services (writ large) was reported by 7% of respondents and covered 24 villages. Unsurprisingly, the within-village coverage of health services was high, with a maximum coverage rate of 76% of households. Finally, 7% of households reported receiving agricultural services. Such services were available in 26 villages and they reached 60% of households at the most in a given village.

Table 7 Household-level coverage of aid between 2015 and 2017

	Mean	SD	Min	Max	Number of villages with coverage (out of 66)
Received any aid (% of households)	0.47	0.22	0	0.96	64
Total types of aid received	0.7	0.45	0	2.4	
Received GFD (% of households)	0.22	0.22	0	0.91	56
SF (% of households)	0.14	0.15	0	0.59	42
Veterinary services (% of households)	0.09	0.11	0	0.38	35
Health (% of households)	0.07	0.15	0	0.76	24
Agriculture (% of households)	0.07	0.13	0	0.60	26

We now turn to the estimations of the determinants of aid intensity at village level. We use the same pre-conflict covariates as for the previous analysis, to which we add the variables of armed groups presence and fatalities within 10km around a village, that are measured over the whole period. In so doing, we wish to uncover the deep-rooted characteristics associated with aid allocation as well as to ascertain the effect of the armed conflict (through control of armed groups and/or conflict-related violence) on aid.

The equation we estimate is as follows:

$$\overline{Aid}_{kj,t+1} = \beta_1 SP_{j,t} + \beta_2 A_{j,t} + \beta_3 W_{j,t} + \beta_4 ED_{j,t} + \beta_5 AG_{j,t+1} + \beta_6 V_{j,t+1} + \gamma_c + u_{j,t} \quad (3)$$

Where $\overline{Aid}_{kj,t+1}$ is the proportion of households in village j that receive aid k in period t+1. The covariates are the same than in equation (1) except for $AG_{j,t+1}$, which represents the presence of armed groups in the village between 2012 and 2017 and $V_{j,t+1}$, which is a measure of conflict intensity in a radius of 10km around the village. Finally, γ_c denotes *cercle*-specific effects. We estimate equation (3) by OLS both without and with *cercle* dummies. The results are in Table 8 and in Table 9.

The results show that the conflict exerts a strong and complex impact on aid intensity at village-level. The presence of armed groups tends to *reduce* aid intensity whereas conflict-related fatalities tend to *increase* aid intensity. Specifically, the presence of armed groups is associated with a 11 percentage point reduction in the proportion of households receiving school feeding, a 8 percentage point reduction in the proportion of households receiving veterinary services and a reduction by half of the types of aid received (the coefficient is 0.4 and the total types of aid received in the sample is 0.7). Both the effects on types of aid and on veterinary services are robust and strongly significant from a statistical point of view. The effect on school feeding is less precisely estimated and is only distinguishable from 0 at the 10% level with the cercle fixed effects.

The number of conflict-related fatalities in a radius of 10km around the village is positively associated with the likelihood of receiving any aid, with the number of aid types received, and with the likelihood of receiving GFD and health services.

6. Discussion and conclusion

We have exploited a unique panel dataset whose first wave was collected just prior to the onset of the armed conflict in Mali to gain some insights on the local characteristics associated with the conflict, on the likely mechanisms through which conflict impacts communities, and on the role conflict plays on aid allocation.

On the first point, we found that villages with higher levels of agricultural production, livestock ownership and assets ownership are more likely to experience the presence of armed groups. These effects are large and suggest that armed groups are opportunistic in how they target villages. Villages with more agricultural production and assets ownership allow armed groups to extract more resources. This echoes previous findings showing that land-rich households are more likely to be targeted by conflict (see e.g. Justino and Verwimp 2013). In contrast, higher levels of food consumption are negatively related to the presence of armed groups. While at first, this may seem contradictory with the previous result, it does not have to be once we recognize that socioeconomic development may exert a complex effect on conflict risks. Subnational research has shown that conflicts tend to happen in less developed places within a given country (see Buhaug and Rod 2006) and there is a very strong relationship at the country-level between indicators of economic of development and lower risks of conflict (see Collier and Hoefller 2004). This is typically explained by the fact that higher development levels mean higher opportunity costs of joining a rebellion, lower grievances against the state and higher state capacity. While visible signs of wealth may attract rebels wishing to extract resources, higher levels of invisible household welfare plays in the opposite direction, as it means villages have more capacity to resist the rebels and/or offer less chance of finding local support.

On the second point, we found that conflict is correlated with a range of long-term drivers of development. These include lack of crime and insecurity, physical mobility, social capital, service provision and access to aid. We know that conflicts exert a long-term impact on human capital and household welfare through their direct effect on household composition but also through their indirect effects going through the factors quoted above. In this paper, we have shown that the presence of armed groups is significantly related to more insecurity, lower trust and that conflict intensity is significantly related to lower social capital and service disruption.

On the third point, we found that the presence of armed groups strongly reduces aid coverage, even after controlling for pre-conflict village characteristics and cercle fixed effects. On the contrary, there is a positive association between the intensity of the conflict-related violence around a village and aid coverage in that same village.

Taken together, the paper has three main policy implications. First, armed conflicts are complex phenomena and reducing conflicts to their level of violence intensity – as is often the case in the literature – blinds us to some important facets of conflict. It is especially important to look at both presence of armed groups and violence intensity as these proved unrelated to each other, and to exert differentiated impacts on people' lives. Second, the presence of armed groups tends to matter the most, at least in the Mopti context. It is not possible to assess whether it is the presence of the groups themselves or rather the absence of the state that is associated with more crime, less trust, and less aid, but in any case looking at violence is not telling the whole story. Third, humanitarian and development actors need to pay attention to issues of control by armed groups over and beyond conflict intensity. Our analysis in Mopti shows that aid practitioners do target areas with more violence, but that they also disengage from areas with armed groups presence.

Finally, it is important to note that the study has a number of limitations. The two most important ones are the sample size and the endogeneity issue. We rely on a sample of 66 villages, out of which about 10 only are conflict-affected (regardless of how we define this). And while we can control for pre-crisis characteristics, and account for cercle fixed effects, it remains true that neither conflict nor aid are randomly determined.

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Table 8 Determinants of aid coverage at village-level between 2015 and 2017

	% households receiving any aid	% households receiving any aid	Number of types of aid received by households	Number of types of aid received by households	% households receiving GFD	% households receiving GFD	% households receiving school feeding	% households receiving school feeding
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Armed groups present	-0.12	-0.13	-0.35**	-0.43***	-0.094	-0.098	-0.11*	-0.11
	(0.084)	(0.087)	(0.15)	(0.15)	(0.080)	(0.062)	(0.061)	(0.065)
Fatalities within 10k	0.016***	0.012**	0.051***	0.044***	0.020***	0.013***	0.0057	0.0055
	(0.0051)	(0.0054)	(0.0094)	(0.0095)	(0.0048)	(0.0039)	(0.0037)	(0.0041)
Primary school within 1km	0.061	0.051	0.036	-0.057	0.068	0.10	0.089	0.091
	(0.10)	(0.10)	(0.18)	(0.18)	(0.095)	(0.074)	(0.073)	(0.078)
Secondary school <5km	0.057	0.060	0.054	0.066	0.12*	0.099*	0.0094	0.0074
	(0.073)	(0.074)	(0.13)	(0.13)	(0.069)	(0.053)	(0.053)	(0.055)
Market within 5km	-0.057	-0.047	-0.15	-0.099	-0.037	-0.037	-0.071	-0.072
	(0.072)	(0.073)	(0.13)	(0.13)	(0.068)	(0.052)	(0.052)	(0.055)
Number of services	0.0054	0.028	0.0062	0.080	-0.0035	-0.015	0.017	0.013
	(0.029)	(0.035)	(0.054)	(0.061)	(0.028)	(0.025)	(0.021)	(0.026)
Ethnic Fractionalisation	0.058	0.14	0.30	0.51	0.027	0.045	0.25	0.24
	(0.21)	(0.21)	(0.38)	(0.37)	(0.19)	(0.15)	(0.15)	(0.16)
Proportion of Peulh	0.002*	0.002	0.004	0.003	0.002	0.001	0.00	0.00
	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
Mean TLU	-0.001	-0.004	-0.011	-0.016	0.01	-0.002	-0.004	-0.004
	(0.01)	(0.01)	(0.018)	(0.017)	(0.01)	(0.007)	(0.01)	(0.01)
Mean land size	0.013	0.019	-0.011	0.012	0.01	0.002	0.002	0.001
	(0.024)	(0.025)	(0.045)	(0.044)	(0.02)	(0.02)	(0.02)	(0.02)
Mean ag. production	-0.003	0.012	0.041	0.047	-0.04	0.012	0.01	0.01
	(0.03)	(0.032)	(0.055)	(0.056)	(0.03)	(0.023)	(0.022)	(0.02)
Mean asset index	0.028	0.031	0.070	0.052	0.002	0.032	-0.005	-0.003
	(0.041)	(0.042)	(0.075)	(0.073)	(0.04)	(0.030)	(0.03)	(0.03)
Mean food consumption*	-0.034	-0.040	-0.066	-0.086	-0.021	-0.014	0.005	0.01
	(0.030)	(0.030)	(0.055)	(0.053)	(0.028)	(0.021)	(0.02)	(0.02)
Mean dietary diversity	0.042	0.062	0.039	0.056	-0.063*	0.0096	0.002	0.005
	(0.037)	(0.040)	(0.067)	(0.070)	(0.035)	(0.029)	(0.03)	(0.03)
Cercle FE	No	Yes	No	Yes	No	Yes	No	Yes
Observations	64	64	64	64	64	64	64	64
R2	0.35	0.37	0.50	0.53	0.47	0.40	0.26	0.22

Table 9 Determinants of aid coverage at village-level between 2015 and 2017

	% households receiving health services	% households receiving health services	% households receiving veterinary services	% households receiving veterinary services	% households receiving agricultural services	% households receiving agricultural services
	(1)	(2)	(3)	(4)	(5)	(6)
Armed groups present	-0.034	-0.063	-0.089**	-0.079**	-0.042	-0.06
	(0.051)	(0.049)	(0.038)	(0.038)	(0.048)	(0.05)
Fatalities within 10k	0.010***	0.011***	-0.001	0.001	0.002	0.001
	(0.0031)	(0.0031)	(0.002)	(0.002)	(0.003)	(0.003)
Primary school <1km	0.063	0.020	0.042	0.046	-0.19***	-0.21***
	(0.061)	(0.058)	(0.045)	(0.046)	(0.057)	(0.057)
Secondary school <5km	-0.056	-0.048	-0.016	-0.0078	-0.065	-0.057
	(0.045)	(0.041)	(0.033)	(0.032)	(0.042)	(0.041)
Market within 5km	-0.039	-0.022	0.032	0.028	0.011	0.022
	(0.044)	(0.041)	(0.032)	(0.032)	(0.041)	(0.040)
Number of services	-0.012	0.010	-0.025*	-0.015	0.030*	0.054***
	(0.018)	(0.020)	(0.013)	(0.015)	(0.016)	(0.019)
Ethnic Fractionalisation	-0.089	-0.048	0.022	0.053	-0.074	-0.013
	(0.13)	(0.12)	(0.092)	(0.094)	(0.12)	(0.12)
Proportion of Peulh	0.001*	0.002**	0.001	0.001*	-0.00	-0.00
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Mean TLU	-0.0024	-0.001	0.006	0.007	-0.007	-0.007
	(0.0060)	(0.006)	(0.004)	(0.004)	(0.01)	(0.01)
Mean land size	-0.014	-0.005	0.019*	0.022*	-0.016	-0.008
	(0.015)	(0.014)	(0.011)	(0.011)	(0.014)	(0.014)
Mean ag. production	0.055***	0.037**	0.0071	0.0041	0.004	-0.001
	(0.018)	(0.018)	(0.013)	(0.014)	(0.017)	(0.018)
Mean asset index	0.048*	0.031	0.012	0.0085	0.008	-0.001
	(0.025)	(0.023)	(0.018)	(0.018)	(0.023)	(0.023)
Mean food consumption*	-0.017	-0.025	-0.017	-0.021	-0.025	-0.032*
	(0.018)	(0.017)	(0.013)	(0.013)	(0.017)	(0.017)
Mean dietary diversity	0.012	-0.011	0.054***	0.046**	0.039*	0.032
	(0.022)	(0.022)	(0.016)	(0.018)	(0.021)	(0.022)
Cercle FE	No	Yes	No	Yes	No	Yes
Observations	64	64	64	64	64	64
R2	0.45	0.39	0.49	0.45	0.38	0.42

Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

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