

Education during conflict: the effect of insurgents' occupation on schooling

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Abstract

This paper studies the short and long-run effect of Islamic insurgents' occupation on educational outcomes, by exploiting the temporary occupation of territory in North East Nigeria by Boko Haram. Comparing children exposed to the occupation and insurgency with children solely affected by the insurgency, the results show that children exposed to Boko Haram's occupation accumulate 0.76 fewer years of education during, and are 29% less likely to return to school after, the occupation. Educational outcomes of Muslim children, who share a social identity with Boko Haram, decrease during the occupation, and this effect persists after the occupation has ended. Those experiencing social pressure to adhere to Boko Haram's anti-educational rule suffer similar initial set-backs, but return to school later. Schooling outcomes of children that experienced school-targeted violence decrease in the short and long-run. Well-documented mechanisms linking exposure to violence and the demand and supply of education during conflict do not explain these results.

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1. Introduction

The last decade has seen an increasing trend in the occupation of territory by non-state actors, among which an increasing number of self-representing Islamic insurgent groups with anti-educational ideologies (Crisis group, 2016; Global Terrorism Index, 2022; Raleigh et al., 2010).^{1,2} Occupation of territory by such actors often involves subsequent denial of access to education for inhabitants as part of the insurgents' governance (GCPEA, 2020). Given the rise of Islamic militias and the threat these groups pose to educational outcomes of individuals confronted with their rule, clear understanding of the effect of occupation and mechanisms behind such effects is crucial. However, though conflict and violence in general have been studied extensively, the impact of occupation and rebels' imposed rules and governance has received little attention. Moreover, existing work does not empirically distinguish between exposure to violence and exposure to occupation. This study addresses this matter, and analyzes the effect of exposure to an Islamic insurgent groups' occupation on educational outcomes.

This is done by focusing on the case of Boko Haram, an Islamic insurgent group that temporarily occupied territory in Nigeria and subsequently imposed its' anti-educational rule on individuals living in those areas. This research thereby specifically answers the question what the effect of Boko Haram's occupation on educational outcomes was *during* the occupation, as well as *after* the occupation had ended. By considering the short and long-run effect of experiencing Boko Haram's occupation on schooling, this article provides a detailed picture of an inherently complex and multi-layered environment.

Conceptually, the occupation – interchangeably called rule or governance – that this paper focuses on is defined as the territorial control of a rebel group and their actions towards civilians that live in that area, specifically the imposition of anti-educational rules. This relates to the definition of rebel governance from Arjona et al. (2015), who defines rebel governance as "the set of actions insurgents engage in to regulate the social, political, and economic life of non-combatants during civil war" (p. 182). Individuals confronted with such occupation and governance face the choice between cooperation or resistance (Arjona et al., 2015). This corresponds to either choosing to comply with Boko Haram's rule and not attending school, or defying the groups' governance and continuing education.

Empirically, using rich panel data on individuals observed across school-years, the extent of cooperation or resistance is estimated using a difference-in-differences (DiD) approach. The treatment is defined as living in an area that was occupied by Boko Haram between 2014 – 2015, thereby having been exposed to the occupation and subsequent anti-educational rule of the group. It is shown that

¹Source: data from the Armed Conflict Location and Event Data project (ACLED): see figure A.3.

²Examples of these groups are Islamic State of Iraq and the Levant (ISIL), the Taliban, al-Shabaab and Boko Haram. All have recently held control over territory (Crisis group, 2016).

the assumptions related to DiD estimation such as the parallel trends assumption (pre-event study), attrition rates, and comparability of the treatment and control group, are satisfied. A large variety of factors that threaten the identification at the heart of this study are discussed. For example, it is shown that the areas that were occupied did not differ significantly from those that remained under government control in terms of infrastructure, public good provision, population density, and so forth. Additionally, to address why Boko Haram might have gained control specific villages or areas and not others, pre-existing positive sentiment towards the group, as well as historical evidence for rejection of the secular state and fundamentalist conflict in the region is discussed. It is shown that these matters do not threaten the identification of the effect. Careful selection of the sample ensures that both the treatment and control group were exposed to the insurgency, avoiding varying exposure to conflict biasing the estimates.³ Finally, inclusion of control variables and fixed effects support the identification of the effect of occupation.

There are two schooling outcomes considered in this study, both observed at the same point in time after the end of the occupation. The first outcome is the change in the total number of years of education (YoE). By estimating the treatment effect on this outcome, the result captures whether or not – and how long – children attended school while the occupation was ongoing: the short-run effect. The second dependent variable captures school attendance rates. An effect of the treatment on this outcome indicates whether initial responses to the occupation were permanent (e.g., children stayed out of school), or shifted when the government regained control (children returning to school): the long-run effect. The results indicate that the occupation of Boko Haram, and subsequent exposure to rebel governance, lead to decreasing educational outcomes for children of mandatory school-going age relative to those who were not exposed to the occupation. During the occupation, those in the treatment group accumulated 0.76 YoE less than their counterparts. Putting this in perspective, the average adult in the region has about 4.90 YoE - hence the set-back of roughly 9 months due to the occupation corresponds to about 16%. Turning to the long-term impact of exposure to occupation, children from households that faced the occupation and governance of Boko Haram were 29% less likely to attend school after the government had retaken control. Considering the heterogeneity of these effects, the result show that male and female children are equally affected during the occupation, but children between 9 – 12 years old at the start of the occupation, are more likely than those of other birth cohorts to experience a set-back in education. In the long-run, however, girls are significantly more likely to stay out of school while there is no difference among children of different ages with respect to school attendance.

The majority of this paper is dedicated to analyzing what drives the main effects. Insight into what determines children's (and their parents') choice to stay out or return to school is of fundamental importance for designing the right development policies and interventions. Based on the literature, it is known that there are various determinants that might make an individual more likely to

³Robustness tests are performed, where different control groups are selected. The tests support the results.

cooperate with insurgents or comply with their rules – i.e., reject education, stay out of school, and have lower educational outcomes. Such determinants are (pre-existing) positive sentiment towards, or (local) support for the rebels (Arjona et al., 2015; Brechenmacher, 2019) increasing the social pressure within groups to conform to the rules (Bursztyn & Jensen, 2017; Panagopoulos, 2014), having social identity markers in common (Stets & Burke, 2000) and experiencing violent enforcement of rule (Arjona et al., 2015; Olson, 1993). Moreover, it is important to highlight the fact that the impact of occupation is studied within a context of insurgency, violence and conflict. Since the occupation was only temporary, individuals faced (the aftermath of) active conflict after the occupation had ended. To account for the impact this might have had on educational outcomes, various well-documented mechanisms are examined. These are economic shocks causing a lower household income, leading to children working instead of going to school (Bundervoet et al., 2009; Duryea et al., 2007; Jacoby & Skoufias, 1997; Thomas et al., 2004), decreasing health statuses of children (Allison, Attisha, et al., 2019), child marriage (Mazurana et al., 2019; Mourtada et al., 2017; Walker, 2013), school supply (Akbulut-Yüksel, 2014; Glewwe & Jacoby, 1994; Jayachandran et al., 2002), and changes to labor market outcomes and education premiums (Chamarbagwala & Morán, 2011; Shemyakina, 2011).

Considering the potential determinants of compliance with Boko Haram's anti-educational rule, there are very interesting findings. First, social identity theory posits that those sharing identity markers – in this case, religion – are more likely to adjust their behavior to be aligned with that of the group. This study finds evidence that this is indeed the case. Children from Muslim households are significantly more likely to have lower educational outcomes, both in the short and long-run, after having been exposed to Boko Haram's prohibition of schooling. This suggests that these children are especially vulnerable with respect to exposure to Islamic insurgent groups. Moreover, this finding highlights the importance of considering occupation independently of violence: other studies have found that the effect of exposure to Boko Haram's violence on school attendance rates is not heterogeneous for children of Muslim households (Bertoni et al., 2019).

Second, the presence of local support for Boko Haram can give rise to social pressure to adhere to the groups' rule. This can be either due to many in the area supporting the group, or out of fear for general retribution when the rules are broken. Therefore, alongside considering social identity, the role played by support for Boko Haram - heightening social pressure - is analyzed. The results paint an interesting picture. While children in areas with high levels of support for Boko Haram suffer significant set-backs in education during the occupation, they are more likely to be attending school in the long-run. This suggests that these children are initially forced out of school (against their will), but they return to school when this is possible.

Third, insurgent groups often use violent enforcement of rule within their territory (Arjona et al., 2015; Olson, 1993). This type of violence is specifically aimed at discouraging specific behavior, such as attending schools, that goes against the rule of the occupying group. Especially Islamic insurgent

groups claim the right to use violence aimed at those not conforming to rule (Crisis group, 2016). Distinguishing school-targeted from non-school targeted violence, this study finds that experiencing the occupation and anti-educational violence leads decreases educational outcomes in both the short and long-run. Importantly, this result does not hold for exposure to non-targeted violence.

Finally, there is very weak to no evidence that any of the conflict mechanisms offer a plausible explanation for the significant decrease in educational outcomes presented. On the contrary: there are significant wage and employment premiums for those that completed (at least) primary education. This diminishes the risk of the estimated effect being driven by conflict, and increases the confidence in the correct identification of the occupation effect.

These results demonstrate the need for accounting for occupation, and not solely violence, when considering the impact of insurgencies involving self-representing Islamic groups and conflict on education. In doing so this study contributes to the growing literature on rebel governance (Arjona, 2014, 2016, 2017; Arjona et al., 2015; Barter, 2015a, 2015b; March & Revkin, 2015). However, the majority of this literature focuses on the insurgents and the strategic value of the occupation of territory and governance, whereas this paper examines the effect of occupation on education for those facing the rebels. By estimating the effect of occupation in a quasi-experimental setting, it presents a novel way of approaching the matter and allows to disentangle effects of violence and conflict from governance and occupation. It thereby contributes to the work on the impact of occupation on civilians (Humphreys & Weinstein, 2006; Kalyvas, 2006; Mampilly, 2012; Rubin, 2020, among others). Importantly, this study is, to my knowledge, one of the first that provides empirical estimates of the impact of rebel occupation on civilians' behavior, additionally showing evidence suggesting that social identity and social pressure are key in explaining why certain people change their behavior in response to occupation and others do not. By discussing these matters and the violent enforcement of a specific (anti-educational) ideology within a framework of behavioral change in response to occupation, this paper contributes to the debate concerned with ideology and attitudes during civil war as mentioned in Hirose et al. (2017). Moreover, by studying the relationship between insurgents' rebel governance and occupation on educational outcomes during conflict, this study adds to the large literature that examines the effect of conflict educational outcomes (Justino, 2011, for an overview) such as governments' expenditure (Lai & Thyne, 2007), educational attainment (Akresh & De Walque, 2008; Chamarbagwala & Morán, 2011; Parlow, 2011; Singh & Shemyakina, 2016; Swee, 2015; Verwimp & Van Bavel, 2014) and school drop-out rates, school attendance and enrollment (Bertoni et al., 2019; Khan & Seltzer, 2016; Shemyakina, 2011; Valente, 2014).

Summarizing, this study demonstrates that educational outcomes are severely affected by occupation of an Islamic insurgent group, on top of the already negative impact of conflict. Focusing on exposure to violence alone is not sufficient to properly examine these effects. The results show that the effects of occupation are not just large, but persist after the group has retreated and the gov-

ernment has regained control - emphasizing the role that can be played by policy and aid aimed at encouraging and enabling education. Second, the effect of exposure rebel governance varies across groups and over time, and cannot be explained by well-known mechanisms found in the literature. However, this study provides first step in the direction of better understanding the role that identity, pressure, and enforcement play with respect to how, and to what extent, various individuals are affected by the occupation. By identifying children that might be most at risk for experiencing large and permanent loss in education, this work can aid the better targeting of policies aimed at improving educational outcomes for children in conflict zones.

The paper is structured as follows. Section 2 contains background information, providing a discussion of Boko Haram and its occupation of territory, as well as evidence that the group actively forbade education and schooling in their proclaimed caliphate. Section 3 discusses a framework within which to consider occupation, rebel governance and conflict, and discusses hypotheses and mechanisms. The data, sample, treatment and control group are discussed in section 4. Section 5 describes the empirical approach, and 6 discusses the identification strategy. Section 7 contains the results, and section 8 the mechanisms behind the effects. Section 9 concludes.

2. Institutional background

Though self-identified Islamic groups' ideologies vary, there are various ideological stances that they have in common: the use of violence aimed at those who are at odds with Islamic imperatives, the obligation to use violence when (Muslim) rulers deviate from this, the goal to found an Islamic state, and rejection of the secular state (Crisis group, 2016). The conquering of territory (as done by Boko Haram, al-Shabaab and Islamic State of Iraq and the Levant (ISIL), and others) is a clear step towards the latter.

Moreover, many organizations that represent themselves as Islamic insurgent groups strongly oppose secular ("Western") education, though there is no religious justification for the anti-educational stance (VOA, 2022). Nevertheless, many of such groups carry out attacks on educational targets such as schools, students and teachers (GCPEA, 2020). Just a few examples are Ansarul Islam, active in Burkina Faso and Mali, Jama'at Nusrat ul-Islam wal-Muslimeen (JNIM) in Mali, Islamic State of Khorasan Province (ISKP) active in Afghanistan, ISIL in Iraq, the Taliban and al-Qaeda in Pakistan, al-Shabaab in Somalia, and Boko Haram in the area of the Lake Chad basin, specifically in Nigeria.

Carrying out attacks instills fear and intimidates the population, and has been shown to decrease schooling outcomes (Bertoni et al., 2019). However, control over territory is fundamental in allowing these groups to further exert their power and (anti-educational) ideology: controlling territory and proclaiming yourself as ruler provides a group with a sense of legitimacy (Loyle et al., 2021), and is a prerequisite for rebels' exercising of local authority (Anders, 2020; Kalyvas, 2006; Kasfir, 2005).

Control over territory allows insurgent groups to – in this case – exercise their anti-educational rule and prohibit schooling. There is evidence that Islamic insurgent groups that occupy territory almost entirely prohibit education, closing schools and prevent other means of schooling (GCPEA, 2020).⁴ This study analyzes the effect that experiencing such occupation has on educational outcomes of children, by focusing on the specific case of Boko Haram and its occupation of territory in North East Nigeria.

2.1. Education in North East Nigeria

Nine years of (primary and junior secondary) education are free and obligatory in Nigeria, as per the Compulsory, Free Universal Basic Education Act implemented in 2004. Nevertheless, Nigeria in general has the largest percentage of out-of-school children in the world (Unicef, 2015) and the lowest educational outcomes of all sub-Saharan countries (Abdullahi & Abdullah, 2014). The situation is especially dire in the North East, a poorer and more rural region.

There are various reasons for the difficult relationship of the population of the North of Nigeria with the education system. Afzal (2020) cites four reasons for this. First, there is a lack of support in the north for the state's imposed, post-colonial, and Western system of education. Second, the education system is held accountable for poor educational outcomes in the north, as the population had not become familiar with it during colonization, contrary to the south. Third, following low educational outcomes, the system is blamed for joblessness and low educational premiums. Finally, Western education is seen to represent the Nigerian state's corruption, as many state officials are Western-educated. Against this background, Boko Haram formed as an insurgent group with clear anti-educational stance.

2.2. The case of Boko Haram

The Boko Haram insurgency started in 2009 and is currently ongoing. Boko Haram is one of the largest militant groups in Africa (CFR, 2022), and is predominantly active around the Lake Chad basin. The Islamic insurgent group rejects all secular aspects of Nigerian society and strives to establish an Islamic state in Nigeria (Anugwom, 2018; Center for International Security and Cooperation, 2018; Omenma et al., 2020; Thurston, 2016) with Shari'a criminal courts (CFR, 2018). It asserts the right to rebel against allegedly infidel states, use force to impose a strict interpretation of Islamic law on civilians (Thurston, 2016), and specifically rejects Western education (Anugwom,

⁴There is only one recorded exception: the case of the Islamic State. The group, after keeping schools closed for prolonged period of time, completely redesign the curriculum to fit with their ideology and allowed children to attend school. However, only specific (IS controlled) schools were allowed, and girls were strongly discouraged from attending (Arvisais & Guidère, 2020). Note that the initial closing of schools and prohibiting of education lead to severe losses in education among children.

2018).⁵

In the years following the initial anti-government uprising that started the insurgency, the frequency, size and impact of the attacks carried about by Boko Haram drastically increased. This change has been attributed to changes in leadership of Boko Haram, as well as Boko Haram's co-operation with al-Qaeda (Center for International Security and Cooperation, 2018). As the Boko Haram grew in size and carried out more attacks, it started to finance itself through robberies, kidnapping, extortion and raids of military stations. In response to the escalating situation the Nigerian government declared the state of emergency in three states in the North East - Borno, Adamawa and Yobe - in May 2013 and deployed a high number of military personnel to the area. Though the number of military personnel in the region increased significantly, Boko Haram started to carry out more military-style offensives on towns in the region, gaining control over various local government areas (LGAs). In the second and third quarter of 2014 Boko Haram captured more territory and declared its caliphate in August 2014.⁶

According to interviews conducted by Amnesty International (2015) with former inhabitants of the caliphate, Boko Haram ruled according to its set of beliefs and ideology. The group actively tried to wipe out all (Western) influences on day-to-day life, and convert and enforce its ideas on the local population.⁷ To aid ruling its caliphate, Boko Haram appointed Emirs who dealt with matters in a town.⁸ Civilians that did not follow the rules risked being trialed and punished.⁹ For those who cooperated with Boko Haram, followed the rules and supported the group, life could sometimes be mildly easier. For example, Boko Haram distributed food, often looted from other villages, among households that supported them. The rules that Boko Haram enforced were aligned with goal to implement a strict Shari'a law in its territory, and were based in its strong anti-democracy and anti (Western) education sentiment. Attending schools and other forms of education were entirely forbidden under Boko Haram's rule.

Boko Haram rapidly expanded the area under control rapidly and continued to do so into early 2015.

⁵Boko Haram, loosely translated, means "Western education is forbidden".

⁶Figure A.5 shows the progression of the occupation of Boko Haram based on this data from ACLED. Considering the pattern of the spread of occupation in figure A.5, it is clear that the group steered clear, or was incapable of, conquering the more central and middle regions of Borno specifically. This can be explained by the fact that the government forces were stationed in September 2014 around Maidiguri (the capital of Borno) and more south towards the northern borders of Damboa and Bama (OCHA).

⁷According to Amnesty International (2015) the rules affected almost every aspect of day-to-day life such as the usage, possession or sale of cigarettes, the type of clothing worn by and general appearance of men and women, the selling of products on markets, etc.

⁸For example, the Emir (often someone from the town that supported Boko Haram) was responsible for approving forms of travel between towns within Boko Haram's territory for civilians, as well as ensuring that Boko Haram's rules were followed. Note that leaving the caliphate was in most cases almost entirely prohibited. In various villages Boko Haram imprisoned people or placed them under constant guard. In places where civilians were allowed to move freely within the town, Boko Haram fighters patrolled the streets and areas between villages, ensuring no-one escaped Boko Haram territory.

⁹In order to deal with such cases, Boko Haram installed institutions such as a courts where civilians' cases were judged.

In January of that year, Goodluck Jonathan - the Nigerian president at the time - supported the creation of an African task-force aimed at countering Boko Haram. In February 2015 the military offensive of the task-force started, and Gwoza - considered the headquarters of Boko Haram - was captured in March 2015. This was considered the end of Boko Haram's caliphate and control over the region.

In the time period that followed, the North East saw a significant drop in violence (CFR, 2018) but suffered the long-term consequences of the conflict and occupation. While Boko Haram was expelled from the areas it controlled, the group still carried out attacks in the region. According to the Crisis group (2017), the extensive damage to the economic infrastructure in various parts of the North East, and bans or restrictions on trade as to deny Boko Haram access to supplies lead to a heightened level of food insecurity. This situation affected the entire North East, but especially Borno, Adamawa and Yobe. After the government had regained control over the region it was possible for humanitarian groups to access the previously occupied LGAs and provide educational, food, and health aid. Importantly, according to Relief web (2017), in all previously occupied states (in the sample used in this study - see section 4) there were NGOs present to provide access to education, quality emergency learning, and educational system strengthening.

Considering the evidence discussed above, it is clear that Boko Haram actively engaged in rebel governance. Moreover, the fact that Boko Haram's strong anti-educational stance was central to this governance makes it a suitable case to examine the effect of Islamic insurgents' occupation of territory and subsequent rule on educational outcomes.

3. Framework and mechanisms

The territorial control of Boko Haram, proclamation of its caliphate in these areas, and the groups' actions towards civilians under their rule are considered the occupation and subsequent rule that this paper focuses on. Conceptually, occupation (often) takes place within a general setting of conflict. This implies that aside from occupation, dynamics relating to conflict are present. Therefore this paper builds on work on rebel governance, in order to capture dynamics in occupied territory and understand how any effects might have arisen, as well as the extensive literature on conflict and its effects on education. The frameworks are applied to the case of Boko Haram, the effects of exposure to conflict and occupation disentangled, and the effect of the latter on educational outcomes estimated. In doing so, this study examines whether those exposed to occupation adjust their behavior to adhere to the rebels' rule, and provides an in-depth discussion of channels and mechanisms that drive these effects.

3.1. Occupation and rebel governance

Occupying territory allows rebels to exercise authority and thereby govern, or impose rules on, the population of those areas (Anders, 2020; Kalyvas, 2006; Kasfir, 2005; Loyle et al., 2021). As discussed in Arjona et al. (2015), when facing rebel governance, the population can either choose to cooperate (comply with the rules) or resist (reject the rules). In the case considered, lower schooling outcomes would imply that an individual adhered with Boko Haram's prohibition of schooling, i.e., cooperated with Boko Haram – and vice versa, with resistance leading to higher schooling outcomes. The literature identifies various determinants that might lead to certain sub-groups of the population being more likely to cooperate or comply. These determinants will be examined as potential sources of heterogeneity of the treatment effect.

3.2. Heterogeneity: social identity, social pressure to conform and enforcement of rule

First, sharing a social identity can lead to a heightened sense of belonging or shared identity among people (Stets & Burke, 2000). Having such a shared identity can lead to higher support for those that have, for example, the same religion (Knott & Lee, 2020; Seul, 1999; Stets & Burke, 2000). As noted by Stets and Burke (2000), those who feel a sense of belonging to a certain group are "more likely than not to participate in that group's culture [...] and show attraction to the group in their behavior" (p. 4). It might be that having a religion in common indeed leads to having a more positive sentiment or higher level of support, compared to those who do not share a religion. Based hereon, this study posits that inhabitants of the caliphate that have identity markers, such as religion, in common with Boko Haram might have been more likely to converge in terms of behavior and attitudes (i.e., rejection of education) than those who do not have similar identity markers.

Additionally, building upon shared identity, the extent of compliance among the local population can be due to pre-existing pro-Boko Haram sentiment among the population. Especially "those who perceive their institutions as illegitimate or ineffective may welcome change" (Arjona et al., 2015, p. 186). Given the anti-Western education sentiment in the North East (Afzal, 2020) as mentioned above, it is likely that many might have been receptive to Boko Haram's viewpoints. Moreover, it is known that weak service provision and negligence on behalf of the government lead to increased local support for Boko Haram (Brechenmacher, 2019). Crucially, it has been shown that rebel control in areas with low government service provision leads to heightened social cohesion within villages (Rubin, 2020). Increased cohesion implies higher levels of social pressure to conform to ideas or rules. Moreover, individuals are more likely to engage with pro-social behavior and compliance with social rules when they are being watched or experience social pressure (Bursztyn & Jensen, 2017; Panagopoulos, 2014). This is especially the case during occupation by insurgents,

when failure to conform is punished, and the negative consequences of one person failing to conform can affect the whole group (Arjona et al., 2015).

This suggests that those who live in an environment where there is stronger pro-Boko Haram sentiment and the occupation increased levels of social control and pressure to conform, will experience lower schooling outcomes. In order to obtain an instrument that measures support for Boko Haram, and consecutive heightened pressure to conform to Boko Haram's rule, this study turns to Archibong (2019). Archibong (2019) shows that areas that were traditionally ruled by a centralized authority and had a Muslim super-majority population experience lower levels of public good provision by the government. The measure of Archibong (2019) will be used as an instrument to capture positive sentiment towards Boko Haram (discussed more in-depth in section 5 and 6) and examine potential heterogeneity of the treatment effect.

Violence can be used as a tool during occupation, conflict and war. It serves a different purpose in occupied and non-occupied territory. According to Olson (1993), insurgents in control of territory (stationary bandits) often strive for "peaceful order". Violence aimed at the civilians is often used to punish disobedience or defiance of groups' governance. This form of violence will be referred to as enforcement of rule. In areas where insurgents govern, cooperation with the occupying rebels most frequently takes place as to avoid such violence (Arjona et al., 2015). Based on this notion, it is expected that those who experience such enforcement are more likely to adjust their behavior (i.e., have lower schooling outcomes) compared to those who are not exposed to such violence.

The differential effects of civil war and conflict with respect to gender are highly context-specific (Buvinić et al., 2014), but it is known that Islamic insurgent groups often strongly oppose girls' education.¹⁰ This dimension to the anti-educational rule will be examined by estimating the potential heterogeneity of the effect by gender. Moreover, the start of the occupation will have coincided with a different stage in the education of each child. A child that is just about to start primary school might opt not to attend school anymore; one that has been going to school already might be more inclined to return. This will be considered by examining the effect for different birth cohorts.

3.3. Education during conflict and civil war

The above focuses on the adjustment of behavior in response to direct exposure to rebel governance. It frames cooperation with Boko Harams during occupation as compliance with its' prohibition of schooling, leading to rejection of education and, in turn, lower educational outcomes. However, this study is also concerned with what happened in the long-run: did children go to school after the government regained control? Did those who might have dropped out during the occupation return to school? These questions – as well as those concerning what happened during the occupation

¹⁰A clear example related to the case at hand is the kidnapping of schoolgirls by Boko Haram in Chibok in 2014.

itself – are answered in a general conflict setting.¹¹ It is therefore important to acknowledge the potential presence of mechanisms that are not specific to occupation and rebel rule, but conflict in general. Moreover, after the occupation, "regular" civil war or conflict dynamics might have become more prominent. Examining these mechanisms additionally serves as a validity test: if the results indicate that any effects can be explained by conflict, this would cast doubt upon the identification of the effect of occupation.

Turning to the literature considering the relationship between educational outcomes and conflict, the dominant narrative is that exposure to (civil) war, conflict and violence has a negative impact on educational outcomes (for an excellent overview, see Justino (2011)). The mechanisms considered in this study are well-documented explanations for the decrease in schooling. First, conflict and civil war can lead to a decrease in income for the household (Bundervoet et al., 2009; Jacoby & Skoufias, 1997; Thomas et al., 2004), causing children to work in order to compensate the loss in household income (Duryea et al., 2007). Second, a decrease in access to healthcare, as well as the potential exposure to danger and violence can lead to worse health among children. Children with worse health are less likely to attend school (Allison, Attisha, et al., 2019). Moreover, child marriage is shown to increase in response to conflict, as the economic situation deteriorates, returns to education diminish, and schooling is disrupted (Mazurana et al., 2019; Mourtada et al., 2017; Walker, 2013). Additionally, when future expected payoffs of having an education are lower, the cost of attending school might not out-weigh potential benefits and children might decide to stay home (Chamarbagwala & Morán, 2011; Shemyakina, 2011).

Considering the general background of conflict and civil war, it is important to examine the role of violence.¹² In non-occupied territory insurgents act as roving bandits and violence in such a setting is aimed at looting and extracting resources (Olson, 1993). This different type of violence (i.e., not aimed at upholding or enforcing rules) can have an impact on educational outcomes. It might be that such general violence is an important mechanism behind the effects on educational outcomes. Various forms of violence will be examined to consider this possibility.

Finally, conflict can affect the supply of education, prohibiting those that want to go to school to do so. For example, children cannot attend school when there are no schools or teachers, i.e., when school supply is low or non-existent (Akbulut-Yuksel, 2014; Glewwe & Jacoby, 1994; Jayachandran et al., 2002). Similarly, it is important to consider whether children might have changed the type of school they attended (whether children might have switched from state to religious schools, etc.) or commute to school has increased.

¹¹Even though Boko Haram was expelled from the areas it controlled, it still carried out attacks in the area and the conflict is considered to have been ongoing.

¹²The potential difference in type (and level) of violence that took place in occupied and non-occupied areas is a potential threat to identification. This will be discussed in section 5 and 6.

4. Data and sample

Individual-level panel data is obtained from three waves of the Nigerian General Household survey (NGHS). Every wave covers two years, and the survey is conducted twice per wave: once during the harvest season (fall), and once during the planting season (spring). Combined, these surveys provide data on schooling outcomes and educational behavior for 2009 – 2013 and 2015 – 2016.¹³ The survey was not conducted in the 2014/2015 school-year, which is the time period that Boko Haram controlled large swathes of territory.

Only individuals born between 1998 and 2008 are included in the sample as to ensure they were of mandatory school-going age prior to the start of the treatment. The sample is further restricted to include only individuals who live in an LGA that was covered in all survey waves.¹⁴ These inclusion restrictions lead to a final sample of 7,202 observations.

The NGHS includes a community component. For this part of the survey a group of community members is surveyed on the presence of various public goods, local events, infrastructure, and so forth. These surveys were conducted in 2010, 2012 and 2016. This study relies on this part of the NGHS to examine potential differences between the communities in the sample prior to and after the treatment, as well as obtain more detailed information on the school supply in the region.

Data on violent events comes from ACLED (Raleigh et al., 2010).¹⁵ Only events categorized as violent (excluding, for example, peaceful protests) and initiated by Boko Haram are considered. Since ACLED includes information on the precise location of the violent event and the NGHS on the location of the household, it is possible to construct variables that capture the individual-level exposure to violence. Similarly, data on the locations of schools is from Archibong et al. (2015), and is used to first determine the school(s) in vicinity of a household, and then determine whether these were attacked by Boko Haram. This is the measure discussed in section 5, and when considering the results with respect to exposure to violent enforcement of Boko Haram's rule. All variables regarding violence are lagged by one year, as to account for last years' events affecting the observed years' decisions on schooling. Note that by doing so, any violence that occurred during the occupation (2014/2015) is accounted for in the analysis.

¹³Respondents are asked about their school attendance, type of school they attended, etc. in the current and/or previous school-year. The survey therefore provides information on the 2009/10, 2011/12, 2012/13, 2015/16 school-years. As the households included in the survey were changed in the fourth wave (2018-2019), this wave is excluded from this study.

¹⁴This is an important inclusion restriction that affects the attrition rates. Due to safety concerns, various LGAs were excluded from the survey in later years. Any individuals living in these regions are excluded from the sample, as they would not have been observed prior to the treatment. However, individuals who potentially might have dropped out of the sample are also excluded.

¹⁵ACLED gathers data on violent events related to Boko Haram through media reports, and a local network of journalists, informants, regional specialists and NGO workers. Any attacks claimed or reported by Boko Haram themselves are cross-referenced with these sources. Through this network ACLED was able to obtain information on events during the height of the conflict and on those that took place in occupied territories.

Additionally, data on the number of primary and secondary school teachers per LGA comes from the Universal Basic Education Commission (UBEC) and is available for 2010, 2011, 2012, 2013 and 2016. Data on rainfall and temperature on LGA level is obtained from the World Bank, and information on migration flows from [FEWS](#). Finally, data on precolonial centralization and ethnic regional majorities is taken from Archibong ([2019](#)) and is used to discuss historical grievances and potential positive sentiment towards Boko Haram in various areas, as well as to measure pro-Boko Haram sentiment in various regions.

4.1. Treatment

The treatment is defined as being exposed to Boko Haram's occupation and rebel governance. Therefore, the territory that was under Boko Haram's control between 2014 – 2015 determines what individuals belong to the treatment group. The areas are identified using two different data sources. First, data from ACLED is used to document where and when (non-)violent transfer of territory to Boko Haram occurred. Second, the data from ACLED is cross-referenced with maps of the IOM ([2015](#)). These maps depict the areas that were fully and partially under Boko Haram control in January 2015 (see figure [A.5](#)). By cross-referencing data from both sources, it is possible to control for potential measurement errors or diverging accounts.¹⁶ All LGAs that have experienced any violent event during which Boko Haram gained control over territory according to ACLED, and were deemed "inaccessible" or "under control of Boko Haram" according to the IOM, are considered to be treated.

As noted previously, Boko Haram lost control of the areas relatively quickly and the occupation was temporary, starting in May 2014 and lasting until Spring 2015.¹⁷ Note that due to the structure of the data – i.e., the last school-year recorded being 2012/2013 – there is a gap of two full school-years between the last pre-treatment observation and the post-treatment observation.

4.2. Specification of control group

The purpose of this study is to isolate and estimate the effect of an Islamic insurgent groups' occupation on educational outcomes. In order to correctly identify the effect, selecting the correct

¹⁶For example, two LGAs (Askira/Uba and Geidam) that did not experience events during which Boko Haram seized control according to ACLED, are considered to be fully controlled by Boko Haram by the IOM. Investigating this further, it turns out that these LGAs are explicitly mentioned in various news sources as having fallen under Boko Haram control and being occupied (Al Jazeera, [2014](#); Anadolu Agency, [2015](#); BBC, [2015](#); France24, [2014](#)). For these reasons, these will also be considered occupied in this study.

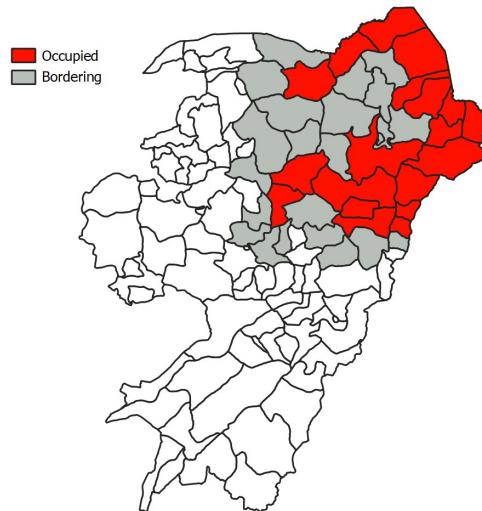
¹⁷As can be seen in figure [A.6](#), the task-force moved in rapidly and almost immediately recaptured the entire area. The figure is based on ACLED event-data and shows the number of events where the government retakes, or non-violent transfers of, territory. As was the case with data on Boko Haram's occupation of territory, it has been noted that the military did not always put out verifiable statements which partially feed into the data shown (through media outlets, etc.). However, as the survey that this study relies on was able to be conducted again in September-November 2015, it is assumed that the areas were no longer under Boko Haram control.

control group is crucial. First, inhabitants of LGAs that did not experience any events during which Boko Haram gained control over territory according to ACLED, and additionally are identified by the IOM (2015) as "fully accessible" or "under control of government forces" in the corresponding time periods are considered eligible to be included in the control group. Second, to support the identification of the effect it is required that the control group experienced the conflict and insurgency, and was additionally comparable to the treatment group in many other ways. As the treatment is on LGA level, the control group is also selected based on what LGAs are most suited.

Technically, there are a few potential control groups. A first group would consist of the entire North Eastern region of Nigeria. This would clearly form the largest sample, but the differences between the individual regions are obviously larger. For example, not all the states in the North East were subject to the state of emergency. However, solely using the state of emergency as an inclusion restriction would not be sufficient: a large number of the LGAs in these states were not exposed to violence due to the insurgency.

Finally, a considerable group of LGAs directly bordered the occupied areas. These areas have been exposed to the violence of the insurgency. Moreover, they were threatened with potential occupation (though none were occupied at any point in time) due to the proximity to Boko Haram's territory. It was therefore unknown to individuals in these LGAs whether they would be "treated" or not. Therefore the control group that will be used in this study consists of the individuals living in a LGA, directly bordering the LGAs that were occupied by Boko Haram (see figure 1).¹⁸

Figure 1: Control group: bordering areas



Note: The maps show various bordering LGAs (in grey) that make up the control group and the treated LGAs (in red) that were occupied by Boko Haram.

¹⁸Note: the results are robust to using different control groups in the specification - see section A.1 in the appendix.

4.3. Descriptive statistics

The treatment and control group have very similar characteristics, though there are some differences that are significantly different from zero (see table A.9). For example, the treatment group contains slightly more rural and smaller, but fewer Muslim households. These differences will be addressed in the estimation by including controls and individual level fixed effects.

The exposure to violence of individuals in our sample is shown in figure A.9. The difference between the two groups is striking: those in the non-occupied areas have, on average, been exposed to higher levels of violence than those in the treatment group. This is in line with the discussion in section 3: rebels acting as stationary bandits (Olson, 1993) in occupied territory have very little incentive to target those living under their rule. Moreover, violence would be aimed at enforcement of rules, more so than 'generic' violence. Simultaneously, violence outside of occupied areas is used in order to loot and extract resources from those not living under rebel rule – such as those in bordering areas. There is anecdotal evidence that this was also the case with Boko Haram: the group was said to use its territory as a base from which to carry out attacks in neighboring areas (CFR, 2018). To account for these differences in exposure to violence, controls for exposure to violence will be included in the analysis.

The two main variables of interest that capture the level of cooperation with Boko Haram's rule on education, change in the YoE and school attendance, are shown in figure A.10. Considering the left panel of the figure, it is clear that the average annual change in YoE among children in the treatment and control group was more or less similar prior to the occupation. This differs greatly between the two groups when considering the change in YoE throughout the years of the occupation. Note that the "gap" in the data, during which Boko Haram occupied LGAs, is about 2.5 years in total, while the occupation of Boko Haram lasted approximately a year.¹⁹ Throughout these 2.5 years the children in the control group witnessed an average increase of 1.3 years in YoE, while children in the treatment group increased their education with about half a year. Considering school attendance (right panel), two things jump out: first, the rate of school attendance was slightly lower for individuals in the treatment group, compared to those in the control group, before the treatment. Second, whereas attendance rates among children in the control group are higher after the occupation than before the occupation, for children in the treatment group the reverse is true: school attendance rates have decreased. This corresponds to anecdotal evidence regarding a significant decrease in school attendance rates among children of obligatory school-going age reported by NGOs such as Unicef (2017). The following section is dedicated to the estimation of these differences between the averages of the two groups with respect to both outcomes.

¹⁹These 2.5 years spanned roughly two school-years, 2013/2014 and 2014/2015, and the summer between those years.

5. Empirical approach

5.1. Difference-in-difference estimation

The objective of this study is to estimate and explain the effect of exposure to Boko Haram's temporary occupation on the change in YoE and school attendance of children. The following model is estimated:

$$Y_{i,t,j} = \alpha_i + \lambda_t + \beta_{i,j,t}(D_t * occupation_{i,j}) + \sigma_{i,j,t}X_{i,j,t} + \epsilon_{i,j,t} \quad (1)$$

Where $Y_{i,t}$ is a continuous variable that captures the change in the total YoE of individual i , living in LGA j , in year t or a binary variable that captures school attendance.²⁰ D_t is a dummy variable that is equal to one for 2014 onward. $occupation$ is the treatment variable, which is equal to one for individuals living in one of the LGAs that were occupied by Boko Haram. α_i captures the individual fixed effects, λ_t the school-year fixed effects, and $\epsilon_{i,t}$ is the error term.

$X_{i,t}$ is a vector of control variables. Controls included are a dummies for whether the father of the child works in agriculture, the child is of mandatory school-going age (6 – 14 y/o), it is a rural household and the household head is Muslim; the household size, the number of sons/daughters of school going age in the household, exposure to violence and individuals' age, as well as and rainfall and temperature (on LGA level).²¹

All standard errors are clustered on LGA level. As there are only 16 clusters in the sample, the robustness of the results is tested by using the wild bootstrap method proposed by Cameron et al. (2008). The results presented are robust to this specification.

5.2. Heterogeneity of effect: drivers of cooperation

As mentioned in section 3, those who share social identity markers with the rebel group and/or have positive sentiment towards the group are more likely to adhere to the rules of the rebels. The first is estimated by interacting the treatment variable with a dummy for whether or not the household is Muslim. The second by using the measure of Archibong (2019) as an instrument to capture higher levels of support for Boko Haram, as well as increased social cohesion. Due to the potential overlap between sharing social identity markers and living in an area with heightened

²⁰The first captures the annual change in total YoE, and is therefore one if a child attended school throughout the school-year, but equal to a maximum of two years during the treatment period due to the gap between the moments the survey was conducted. The latter variable is based on the answers respondents gave to the "Are you currently attending school?" or "Did you attend school in the previous school-year?" survey questions.

²¹Violence is measured as number of fatalities due to Boko Haram related events within a 5km radius of the household, similar to the measure used by Bertoni et al. (2019).

support for Boko Haram, these two factors will be considered simultaneously.²²

Additionally, enforcement of rule is an important tool rebels use in order to influence the behavior of those they govern. By using violence to ensure civilians adhere to the prohibition of schooling, Boko Haram might have intimidated the population and raised fears of punishment. It is examined whether the baseline effect is driven by those who have experienced targeted violence by considering the heterogeneity of the effect for those who have, and have not, experienced such enforcement. Enforcement is operationalized by a variable capturing attacks to the school closest to the household.

Finally, the literature suggests that it is likely that there are differences in educational outcomes by gender and birth cohort. All the mentioned factors potentially leading to a heterogeneous effect – social identity, social pressure, school-focused violence, gender and birth cohort, captured below by $W_{i,j,t}$ – are interacted with the treatment variable in equation 2.

$$Y_{i,t,j} = \alpha_i + \lambda_t + \beta_{i,j,t}(D_t * occupation_{i,j} * W_{i,t,j}) + \sigma_{i,j,t}X_{i,j,t} + \epsilon_{i,j,t} \quad (2)$$

Importantly, aside from providing insight into the workings of the effect of occupation by Islamic insurgents', these sources of heterogeneity serve as an additional test: if there is evidence that the treatment effect is indeed heterogeneous for these groups, the notion that the effect of occupation is correctly identified is further supported.

5.3. Mechanisms

This study considers the effect of exposure to rebel governance through living in occupied areas within a context of civil war. Therefore, aside from estimating the effects as outlined above, it is important to consider what mechanisms – potentially due to the general conflict setting – might drive the effects. The first group of mechanisms affects the demand for schooling, such as child labor (whether a child works for a household farm, did other paid work, or for a household business), child health (whether a child got sick, or visited a doctor or other healthcare professional), child marriage, and decreasing labor market prospects or potential future returns to education. Additionally, fear and intimidation due to having experienced violence might cause a decline in demand for schooling.²³ The second group affects the supply of education (the number of primary and secondary schools, whether the time to get to school has increased, the type of school has

²²I.e., since support for Boko Haram is likely higher among Muslims, there is a higher chance that someone that lives in an area with higher support for Boko Haram is Muslim. By estimating the role of social identity and social pressure identity simultaneously, this is controlled for.

²³Though violence targeted at schools is examined as a potential determinant for cooperation with Boko Haram's anti-educational rule, exposure to 'general' violence (attacks on civilians, explosions and remote violence and battles in the vicinity (10km radius) of the household) might be able to explain shifts in behavior as well. Moreover, by examining violence as a potential mechanism it is shown whether violence, and not occupation and subsequent exposure to rebel governance, is the driver behind the effects.

changed). All these mechanisms are estimated by regressing the treatment variable together with the controls, as above, on the respective outcomes:

$$V_{i,t,j} = \alpha_i + \lambda_t + \beta_1 D_t * occupation_{i,j} + \beta_2 X_{i,t} + \epsilon_{i,t} \quad (3)$$

Where $V_{i,t,j}$ captures dummies for child labor, child health, child marriage; or continuous variables capturing violence, school supply and payoffs of education. Note that if the effect of occupation is correctly identified, it is not expected to find evidence for any of the mechanisms above.

6. Identification

The previous sections elaborated on the selection of the control group, the comparability of the treatment and control group, and laid out the empirical strategy. This section focuses on the identification of the effect, and provides a discussion to what extent and under what conditions the occupation of areas can plausibly be considered to be exogenous. Additionally, various potential threats to the identification of the effect are considered.

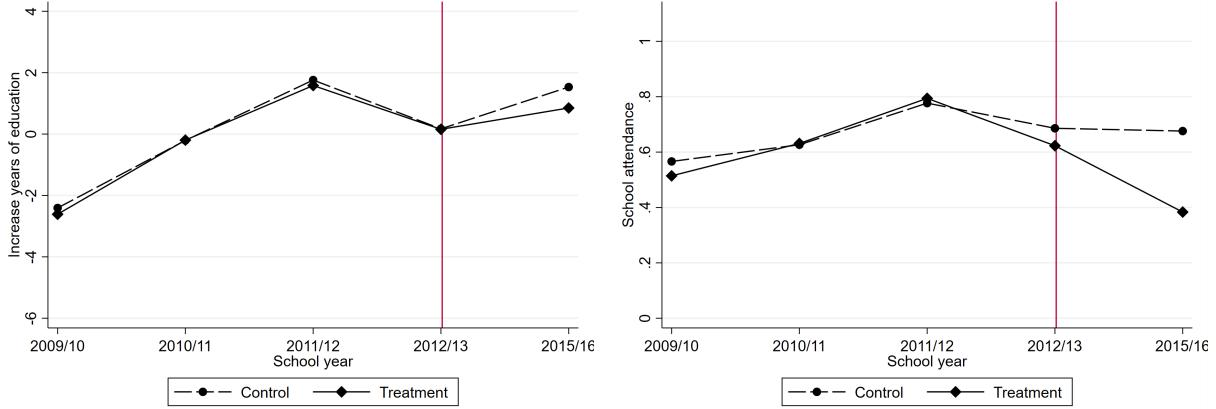
This section starts with discussing the usual assumptions related to DiD estimation. First, it is important that the treatment and control group show similar trends prior to the intervention (pre-event study). Second, it should not be the case that there are very high attrition rates due to the treatment, or forms of self-selection into either group.

The majority of this section discusses factors that might have contributed to certain areas being occupied, while others remained under government control. Such confounding factors are positive sentiment towards Boko Haram among the population that might have allowed the group to occupy certain areas more easily, area characteristics such as ruggedness of the terrain, population density, or the distance to Boko Haram's basecamp in the Sambisa Forest; and community-level variables related to local infrastructure, public good provision, and development.

6.1. Pre-event study

In order to ensure that the difference-in-differences estimation truly captures the effect of occupation certain assumptions should be satisfied. First, it is important that the treatment and control group show similar trends prior to the intervention (pre-event study). The trends, conditional on the control variables as in model (1), of the treatment and control group with respect to the change in YoE and school attendance are presented in figure 2. Clearly, the trends of the treatment and control group with respect to both outcomes follow very similar paths prior to the start of the treatment.

Figure 2: Pre-event study: change in YoE and school attendance



Note: The conditional trends for change in YoE and school attendance for the control (dashed line) and treatment (solid line) group. Note that the occupation started in 2014, but the last available observation in the data is the 2012/2013 school-year (Spring 2013); hence the placement of the red treatment line on the x-axis. Finally, the gap between each observed data point is one school-year, except for the last interval, which spans two school-years.

6.2. Attrition and migration

Attrition is, with the treatment being living in an area occupied by an extremely violent terrorist group, an obvious concern. The attrition rate is twelve percent in the control group, and there is no attrition in the treatment group. There are various explanations for this.

First, as mentioned above, the survey design was altered in 2015 in order to adjust to the situation in the North East. Any LGAs that are not continuously included in the survey design are excluded by default, thereby potentially omitting the respondents that might have otherwise been in the treatment group. Second, the higher attrition rate in the control group might be due to various households having the possibility to flee the area, while this was not an option for those who lived in occupied territories. Many individuals do not have the option to flee conflict zones as they have no place to go (for example, no family members they can stay with), the refugee camps are not considered a feasible alternative, or fleeing itself is too dangerous (Unicef, 2015). Additionally, as discussed in section 2, Boko Haram prohibited inhabitants of occupied villages to leave the area. Third, it is important to consider migration with respect to exposure to violence. Correlating the different types of violence (battles, attacks on civilians, and explosions/remote violence) with data on migration flows from FEWS, it seems that migration between 2014–2016 was primarily driven by attacks on civilians in the years prior. This corresponds – considering that the control group was exposed to higher levels of violence as shown in figure A.9 – to the higher attrition rates in the control group.

All the individuals that attrited are removed from the sample. Importantly, there do not seem to be any differences with respect to age, gender, various household characteristics, or exposure

to violence between these individuals and those who remained in the sample. To account for the potential differences in exposure to violence, variables capturing exposure to violence in vicinity of the household are included in every analysis.

6.3. LGA-level: Pro-Boko Haram sentiment and other factors

The fact that only specific areas were occupied by Boko Haram might raise concerns that, for whatever reason, it was easier to gain control over these areas than over others. One possible explanation is that there was (heightened) pro-Boko Haram sentiment among the population of certain areas. If this is the case, it is a clear threat to the identification of the effect and exogeneity of the treatment. A shortened explanation of this inherently complex matter is included here: for a full discussion of this matter, the reader is referred to Adesoji (2011), Aghedo (2017), and Archibong (2019).

Boko Haram is not the first fundamentalist Islamic group that carries out violent attacks and incites uprisings in the North East. There is evidence of longer-running grievances and anti-governmental sentiment, often linked to the North having a long tradition of being ruled by a Muslim elite and how this ended under military rule in 1976.²⁴ Considering the current-day impact hereof, Archibong (2019) shows that there is a significant negative association between the precolonial centralization of a region that also had a Muslim majority population, and access to public goods and infrastructure. As mentioned in section 3, the perception of institutions - such as the education system and schools - with respect to their effectiveness and legitimacy can determine local support for insurgents (Arjona et al., 2015). Specific to the case of this study, Brechenmacher (2019) finds that weak service provision and negligence on behalf of the government lead to increased local support for Boko Haram.

The measure of Archibong (2019) is used as an instrument for an area having higher levels of positive sentiment towards Boko Haram. It is estimated whether the level of support for Boko Haram differs across the treatment and control group. If this would be the case, the positive sentiment might be

²⁴Many scholars refer to the Maitatsine followers and uprisings in the 1980s as drawing on similar anti-Western, anti-secular, and anti-educational sentiment and ideology as Boko Haram (Adesoji, 2011; Aghedo, 2017). This sentiment has its roots in religious and ethnic differences (between the North and South), pre-existing economic conditions, and local governance. For an excellent discussion of these matters and their relationship to current-day local development, see Archibong (2019). Summarizing, Archibong (2019) shows that centralized regions (with a clearly identifiable sovereign) had the ability to bargain with the federal (British) regime to obtain access to public goods or infrastructure in colonial times. In order to be able to bargain, a region had to be compliant – for example, through supporting direct taxation. Moreover, in the northern part of Nigeria, the ruling Muslim elite was granted a significant level of autonomy, especially with respect to matters of religion and tradition (Adesoji, 2011; Aghedo, 2017). This level of autonomy was institutionalized first in the Native Authority Proclamation of 1907, and later again in the Native Authority Law of 1954. The latter ensured that these ethnic regional leaders, in northern areas where the population was predominantly Muslim, had almost absolute power and were able to implement, for example, Shari'a law. In 1976, under military rule and after the civil war, these leaders were removed from politics. This abrupt end to the absolute power of the regional leaders faced strong opposition and contributed to local grievances and anti-governmental sentiment.

able to explain why Boko Haram managed to occupy and hold on to certain territories, and was not able to do so with respect to other LGAs that do not share historical similarities.

Table A.10 shows that there was no significant difference between non-occupied, bordering LGAs and the occupied LGAs in terms of the measure for positive sentiment towards Boko Haram. Additional factors, such as population density, ruggedness of the terrain, and the distance to the Sambisa forest - Boko Haram's initial base - are also considered. The areas that were occupied are more rugged and more likely to be close to the Sambisa forest. The differences in these time-invariant variables are addressed by including fixed effects.

6.4. Community level: development, infrastructure and provision of public goods

Are the communities, villages or towns in the occupied and non-occupied areas comparable? The community-survey data from the NGHS, where respondents from villages are asked about the presence of various public goods and infrastructure, is used to answer this question. Table A.11 shows whether public goods are present in the average community in the treatment and control group. In terms of development and local infrastructure the communities that were occupied were similar to those that remained under government control, with the exception of treated areas having a higher number of health centers. Remaining unobserved structural differences between occupied and non-occupied communities are addressed by including individual, as well as school-year fixed effects in every estimation. As individuals do not move, including these effects captures community-level fixed effects.

7. Results

As Boko Haram's occupation was temporary, it is possible to study the short and long-run effects of exposure to the groups' occupation on educational outcomes. As outlined in section 5, two different dependent variables are used. First, the change in the total number of years of education (YoE). By estimating the effect of the occupation on this outcome, the result captures whether or not - and how long - children attended school in this time period (the short-run effect). The second dependent variable captures school attendance rates, observed after the occupation had ended. This variable indicates whether schooling behavior was affected after the occupation had ended and the government regained control (the long-run effect).

7.1. During the occupation: change in YoE

Column one of table 1 shows the results of the baseline estimation of the short-run effect, capturing changes in schooling behavior during the occupation. Children in areas that were occupied

accumulated 0.76 fewer years of schooling, corresponding to about nine months, throughout the occupation compared to children in non-occupied areas, controlling for pre-treatment differences between these groups. This set-back of nine months is incurred in the time period of about two and a half years (two full school-years) between the last pre-treatment point in the data (March 2013) and the first post-treatment observation (September 2015). As noted in section 3, though the exact duration of Boko Haram's occupation of various areas differs, LGAs were occupied for eleven months on average. To put the number in perspective, the average number of YoE for adults in the sample is 4.90. This implies that the set-back of 0.76 corresponds to about 16 percent of the average educational achievement in the region.

Considering the heterogeneity of this effect provides insight into who was most likely to comply with Boko Haram's anti-educational rule. First, the results indicate that there is no significant difference between genders. However, there is a clear difference between birth cohorts. Younger children, born between 2003 and 2005, are more likely to have accumulated less YoE than their counterparts who did not experience Boko Haram's occupation. This implies that younger children, who might have just started school, were more likely to stay or be kept at home.

Furthermore, those who share a social identity with Boko Haram – children from Muslim households – are more likely to have significantly lower schooling outcomes at the end of the occupation. Given the evidence that those who broke the Boko Haram's rules were punished (Amnesty International, 2015) and the repercussions of resistance to a group's governance can present negative externalities on the wider population (Arjona et al., 2015), it was expected that those who experience social pressure to conform and/or live in areas with high(er) levels of support for Boko Haram adhere to the prohibition of education. The results indicate that this is the case. Children who lived in areas with positive sentiment towards Boko Haram, and (whose parents or household) might have experienced social pressure to conform, suffer significant negative setbacks compared to children who do not experience this pressure.

There are interesting findings with respect to violence. First, having experienced (non-)school focused violence is associated with a higher increasing education. This is most likely a case of reverse causality: places where education might be higher, and more children attended school, might have been targets for Boko Haram. Second, there is a strong, significant negative effect from having experienced Boko Haram's enforcement of its anti-educational ideology (violence targeted at schools, teachers, students, etc.). Those who have experienced such violence increased their education less throughout the time period than those who were not exposed to it. Moreover, there does not seem to be a significant impact from having experienced non-targeted violence while being occupied.

Table 1: The short-run effect: change in YoE during the occupation

	Baseline (1)	Gender (2)	Birth Cohort (3)	Social identity & pressure (4)	Enforcement of rule (5)
Occupation	-0.755*** (0.212)	-0.663** (0.242)	-0.486* (0.255)	-0.027 (0.208)	-1.102*** (0.341)
Occ.#Female		-0.190 (0.172)			
Occ.#Cohort '03-'05			-0.506* (0.261)		
Occ.#Cohort '06-'08			-0.458 (0.317)		
Occ.#Identity				-0.929** (0.358)	
Occ.#Pressure				-0.362** (0.130)	
School-violence					0.074 (0.093)
Occ.#School-violence					-0.519* (0.295)
Non-school violence					0.310** (0.123)
Occ.#Non-school violence					0.383 (0.410)
Controls	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes	Yes	Yes
<i>N</i>	1429	1429	1429	1130	1429
Clusters	16	16	16	11	16

Note: The table shows the results of the estimation of the treatment effect, being exposed to Boko Haram's occupation, on the change in YoE throughout the occupation. Being female, Muslim, ones' birth cohort, and living in an area with positive sentiment towards Boko Haram are time invariant variables and absorbed by the individual fixed effects. The three birth cohorts are defined as children being born between 1998-2002, 2003-2005 or 2006-2008. Controls as laid out in section 5. Standard errors, clustered on LGA, in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

7.2. After the occupation: school attendance rates

When considering the long-term impact of Boko Haram's occupation on school attendance rates, the results indicate that children in the treatment group are 29 percent less likely to be attending school than children in the control group (see column one, table 2). This indicates that potential changes in behavior during the occupation - rejecting education, not attending school - have carried over until after the occupation. Moreover, as it was known that though Boko Haram was expelled from the occupied territories, the group was not fully defeated, fear of Boko Haram returning might have prevented children from returning to school.

When considering the heterogeneity of the effect by gender, it seems to be the case that girls specifically are more likely to drop out of school. Interestingly, there does not seem to be a

difference across birth cohorts with respect to school attendance after the occupation. This might imply that the younger children who suffered larger educational set-backs during the occupation continue their education afterwards. They might 'catch-up' on missed schooling.

Table 2: The long-run effect: school attendance after the occupation

	Baseline (1)	Gender (2)	Birth Cohort (3)	Social identity & pressure (4)	Enforcement of rule (5)
Occupation	-0.289** (0.108)	-0.136* (0.073)	-0.245* (0.130)	-0.366*** (0.069)	-0.229*** (0.059)
Occ.#Female		-0.290** (0.125)			
Occ.#Cohort '03-'05			-0.073 (0.185)		
Occ.#Cohort '06-'08			-0.088 (0.189)		
Occ.#Identity				-0.310** (0.128)	
Occ.#Pressure				0.192*** (0.037)	
School-violence					-0.040 (0.062)
Occ.#School-violence					-0.520*** (0.104)
Non-school violence					0.120** (0.053)
Occ.#Non-school violence					-0.038 (0.104)
Controls	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes	Yes	Yes
<i>N</i>	1689	1689	1689	1333	1689
Clusters	16	16	16	11	16

Note: The table shows the results of the estimation of the treatment effect, being exposed to Boko Haram's occupation, on school attendance rates after the occupation had ended. Being female, Muslim, ones' birth cohort, and living in an area with positive sentiment towards Boko Haram are time invariant variables and absorbed by the individual fixed effects. The three birth cohorts are defined as children being born between 1998-2002, 2003-2005 or 2006-2008. Controls as laid out in section 5. Standard errors, clustered on LGA, in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Children from Muslim households - who experienced potentially the strongest negative effect during the occupation itself - show significantly lower school attendance rates afterwards. Unfortunately, if these children stay out of school, the initial set-back might become permanent and result in definite loss in educational outcomes. Interestingly – when controlling for whether a child is from a Muslim household and faced the occupation – children from areas with heightened social pressure are more likely to be attending school. It might be that the pressure to comply with Boko Haram's prohibition of schooling diminished in the long-run, resulting in these children returning to school.

Finally, those who have experienced the enforcement of Boko Haram's rule are much less likely to attend school after the occupation has ended. Having experienced significant pressure and intimidation to stay out of school through exposure to school-targeted violence, arguably lead to high levels of fear, keeping children out of school in the long-run.

As a robustness test (section A.1) the baseline effects are estimated using a sample including the entire North East and a sample including Yobe, Adamawa and Borno, states where the state of emergency was declared. The results are robust to these specifications with larger sample sizes and a higher number of clusters. Though solely the baseline effects are shown in table A.8, the heterogeneous effects are similar to those in tables 1 and 2.

Summarizing, there is evidence that living in an area that is occupied by Islamic insurgents who harbor a strong anti-educational view has significant and negative impact on educational outcomes both during, but also after, the occupation. The fact that the heterogeneity of the effect is well-explained through a framework of occupation and rebel governance strengthens the assumption that the effect is correctly identified.

8. Mechanisms

The above focuses on the adjustment of behavior in response to occupation. However, after the occupation ended individuals no longer faced rebel rule: in this time period, "regular" civil war or conflict dynamics might have become more prominent. Considering the potential presence of mechanisms that are not specific to occupation, but conflict, acts as a validity test. If the previously presented results can be well-explained through conflict mechanisms, this would cast doubt upon the identification of the effect of occupation. To this end, various mechanisms affecting the demand for and supply of education are discussed below.

8.1. Demand side mechanisms

8.1.1. Child labor, health status, and marriage

A potential explanation for the decrease in schooling is that the conflict lead to a drop in household income, increasing the need for children to work instead of attending school (Bundervoet et al., 2009; Duryea et al., 2007; Jacoby & Skoufias, 1997; Thomas et al., 2004). The household survey provides data on whether an individual worked outside the household, for a household owned business or on the household farm. Table 3 contains the results. There is no evidence of differences in the labor choices between children in the treatment or control group.

Moreover, there are no results that suggest that health status might influence whether or not a

child attends. This eliminates the possibility that the insurgency worsened the health of children, either through exposure to violence or lack of access to healthcare (Allison, Attisha, et al., 2019). Data from the NGHS on health status and healthcare usage is used to shed light on this matter. The survey includes questions on whether the child visited a doctor or healthcare professional, was ill, or sustained an injury in the past four weeks. The results are presented in table 3, column four and five.²⁵

Another well-documented mechanism linking decreased educational outcomes to conflict is child marriage. Child marriage has been shown to be common during insurgencies and civil war due to increased insecurity, and is linked with lower educational attainment and school drop-out (Mazurana et al., 2019; Mourtada et al., 2017; Nguyen & Wodon, 2014; Parsons et al., 2015; Walker, 2013). It is possible that children got married during or after the occupation, leading them to drop out of school. The results are presented in table 3, column six. The rate of child marriage seems to not be affected by the occupation of Boko Haram. The effect (not shown here) is not heterogeneous by gender.

Finally, the household survey offers a way to gain insight into what children are up to when not attending school. When asked for a reason as to why children are not working or studying, those living in areas that were occupied by Boko Haram are 23 percent more likely to indicate that they stay at home in order to perform household and childcare tasks (column 7, table 3). It is noteworthy that the lack level of parental interest cited as a reason for not attending school seems to not be (significantly) affected.

Table 3: Mechanisms: labor, health, marriage, house work and interest in schooling

	Child labor			Health status		Child marriage		Other	
	(1) Household business	(2) Household farm	(3) Other work	(4) Illness or injury	(5) Doctor visit	(6) Child is married	(7) Household or childcare	(8) (Parental) interest	
Occupation	-0.028 (0.031)	-0.096 (0.061)	0.004 (0.010)	0.034 (0.025)	0.019 (0.028)	-0.018 (0.014)	0.227** (0.103)	0.204 (0.189)	
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Individual FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
N	1691	1691	1691	1083	1083	1691	1691	609	
Clusters	16	16	16	16	16	16	16	16	

Note: The table shows the results of the estimation of (3) for various mechanisms. All dependent variables are dummies, equal to one if the answer of the child was "yes" when asked whether s/he performed any tasks, was employed, married, visited a doctor, etc. Standard errors, clustered on LGA, in parentheses.* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

²⁵There are no differences in the presence of hospitals, health centers or pharmacies in previously occupied communities and those that were not occupied - see table A.12.

8.1.2. (Un)employment and returns to education

Education is an investment that is made if there is an expected likelihood of future returns. Conflict might negatively expect these expectations, resulting in deteriorating schooling outcomes (Chamarbagwala & Morán, 2011; Shemyakina, 2011). In order to examine this mechanism, various factors are considered: whether there are general labor market effects due to the occupation, and if the occupation had a differential effect on those that completed primary education, i.e., whether the returns to education have changed. Since especially girls seemed to not return to school in the long-run, the analysis is also run for a sub-sample of women.²⁶

There is no evidence that the occupation had a general negative effect on the labor market (table 4). Moreover, there seems to be an education premium: those with at least primary school education earn relatively higher wages and are more likely to be employed – but not work more hours – than those without a primary school education. Interestingly, when considering these effects for women only (table 5), the results suggest that the occupation resulted in women working more hours. However, women with a primary school education work relatively fewer hours and are more likely to be employed than women without such an education level. These results do not directly explain why girls are significantly more likely to stay out of school after the occupation.

Table 4: (Un)employment and returns to education

	General employment effects			Education premiums		
	Wage (1)	Employment (2)	Hours worked (3)	Wage (4)	Employment (5)	Hours worked (6)
Occupation	-10.727 (17.693)	-0.029 (0.077)	2.850 (6.957)	-80.552** (30.175)	-0.141 (0.084)	28.353 (31.331)
Occ. * P.educ.				78.413*** (14.333)	0.272*** (0.082)	-38.117 (31.009)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes	Yes	Yes	Yes
N	204	2190	900	204	2190	900
Clusters	15	16	16	16	16	16

Note: The table shows the results of the estimation of (3) for the effect of occupation on (un)employment, labor market prospects, and education premiums. Wage is the average wage (in thousands of Naira) of an employed respondent, employment is a dummy equal to one when the respondent indicates to be employed, and hours worked captures the weekly number of hours worked as reported by employed respondents. P.educ. is a dummy equal to one when a respondent has completed primary education, defined as 6 or more YoE. Standard errors, clustered on LGA, in parentheses.* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

²⁶The sample is expanded to include individuals that are 15 or older (i.e., older than mandatory school-going age), observed at least once before and after the treatment period, and living in either the occupied or bordering areas are included in this sample.

Table 5: (Un)employment and returns to education: women

	General employment effects			Education premiums		
	Wage (1)	Employment (2)	Hours worked (3)	Wage (4)	Employment (5)	Hours worked (6)
Occupation	-21.419 (13.967)	0.030 (0.087)	36.391*** (2.793)	-22.636 (21.706)	-0.038 (0.099)	72.588*** (6.700)
Occ. * P.educ.				2.039 (12.761)	0.238*** (0.079)	-67.729*** (6.503)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes	Yes	Yes	Yes
N	64	1107	406	64	1107	406
Clusters	9	16	16	9	16	16

Note: The table shows the results of the estimation of (3) for the effect of occupation on (un)employment, labor market prospects, and education premiums for a sub-sample of women. Wage is the average wage (in thousands of Naira) of an employed respondent, employment is a dummy equal to one when the respondent indicates to be employed, and hours worked captures the weekly number of hours worked as reported by employed respondents. P.educ. is a dummy equal to one when a respondent has completed primary education, defined as 6 or more YoE. Standard errors, clustered on LGA, in parentheses.* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

8.1.3. Exposure to violence

Violence is a frequently cited reason for children to be kept home and not attend school (Unicef, 2015), with fear of attacks thereby decreasing the demand for education. Though the heterogeneity of the effect is examined for those experiencing non-school and school-focused violence, a potential difference in exposure to the types of violence close to the household might play a role. In order to examine this possible mechanism, the three main forms of violence – attacks on civilians, battles, and explosions/remote violence – taking place within a 10km radius of the household are considered. The results are shown in 6. There does not seem to be any evidence suggesting that exposure to violence is a mechanism through which the demand for education decreased, driving the negative effects of the occupation on schooling outcomes.

Table 6: Exposure to violence

	Attacks on civilians		Explosions and remote violence
	(1)	(2)	(3)
Occupation	0.160 (0.900)	-0.943 (0.677)	0.783 (0.682)
Controls	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes
N	1691	1691	1691
Clusters	16	16	16

Note: The table shows the results of the estimation of (3) for attacks on civilians, battles or explosions/remote violence within a 10km radius, capturing whether the household was more likely to experience those when living in the occupied areas. Standard errors, clustered on LGA, in parentheses.* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

8.2. Supply side mechanisms

8.2.1. School supply

It has been shown that physical destruction of infrastructure, such as the destruction of school buildings, leads to lower educational outcomes (Akbulut-Yuksel, 2014). Moreover, school accessibility has been found to be positively correlated to schooling (Jayachandran et al., 2002). A low(er) school supply is a logical mechanism behind the decrease in schooling outcomes in the occupied areas. The absence or destruction of schools or other educational facilities might prevent children from going to school. Moreover, school-targeted violence might have lead the destruction of buildings or teachers leaving the area.

The school supply channel is examined in various ways. First, using the community-survey data from the NGHS, the presence of schools in the villages of the respondents in the sample after the occupation is studied.²⁷ The occupation does not seem to have had a significant effect on the presence of schools in the communities (see column one and two of table 7). Surprisingly, school-targeted violence did not have a negative effect on the presence of schools.

Finally, there are hints that there was a drop in the number of secondary school teachers.²⁸ However, given that the average age of the sample is nine and most children indicate they attend primary school, it is not likely that this decrease can explain the decrease in educational outcomes. In general, the presence of both primary and secondary schools suggests that children (or their parents) technically have the option to attend school.

Moreover, there is no evidence that children who did attend school after the occupation were more likely to attend a different type of school, faced higher commuting times, or that the education-related expenditure incurred by the household was higher. These results are shown in table A.13.²⁹

As a final test, it is examined whether the overall level of development or presence of infrastructure and public goods differed between communities in the occupied and non-occupied areas in the post-treatment period. The results are shown in table A.12. There are barely any police stations in the treated areas: this might contribute to lower levels of (perceived) safety, potentially affecting the demand for schooling. However, there are no other differences between the communities.

²⁷The community survey was conducted during the fall of 2015, after the end of Boko Haram's occupation of various LGAs.

²⁸The data from UBEC on LGAs that were previously occupied is very limited (there is only one LGA included in the data) and the results are therefore not conclusive and for this reason not shown here. If one would ignore this blatant shortcoming and consider the impact of the occupation on the number of primary and junior secondary school teachers, there seem to be more junior secondary school teachers, but significantly less primary school teachers. The absence of teachers or a high student to teacher ratio in a primary school might explain part of the drop in school attendance.

²⁹A note on the type of school attended in general: the 82 percent of the children in the sample attend federal, state or local government schools, 8.9 percent private schools, 0.7 percent a community school and 8.4 percent a religious school.

Table 7: School supply

	Primary schools (1)	Secondary schools (2)	Primary schools (3)	Secondary schools (4)
Occupation	-0.025 (0.021)	-0.064 (0.060)	-0.034 (0.026)	-0.064 (0.063)
Occ.#School			0.073 (0.055)	0.017 (0.194)
School-violence			-0.051 (0.046)	-0.037 (0.190)
Controls	Yes	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
<i>N</i>	1691	1691	1691	1691
Clusters	16	16	16	16

Note: The table shows the results of the estimation of (3) for school supply. The dependent variable is a dummy that indicates the presence of either a primary or secondary school in the community. Standard errors, clustered by community (column one and two) or on LGA (column three to six), in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Summarizing, there is weak to no evidence that supports any of the mechanisms as a plausible explanation for the significant decrease in educational outcomes presented. This diminishes the risk of the estimated effect being driven by conflict, and increases the confidence in the correct identification of the occupation effect.

9. Concluding remarks

Between one-fourth to one-third of all insurgents occupy territory at some point (Huang, 2016; Stewart, 2018) subsequently exposing civilians to their governance (Arjona, 2016; Rubin, 2020; Stewart, 2018; Wood, 2008). Moreover, given the rise of Islamic militias and the threat these groups pose to educational outcomes of individuals confronted with their rule, clear understanding of the effect of occupation and mechanisms behind such effects is crucial. This study disentangled the effect of conflict and occupation, and estimates the effect of the latter on educational outcomes.

In doing so, it examined whether those exposed to occupation adjust their behavior to adhere to the insurgents' prohibition of education in the short and long-run, and provided an in-depth discussion of channels and mechanisms that drive these effects. The focus was on the case of Boko Haram, an Islamic insurgent group with strong anti-educational stance, that temporarily occupied various areas in North East Nigeria between 2014 and 2015. The temporary occupation of territory by Boko Haram was exploited as a quasi-natural experiment where a certain part of the population was exposed to occupation and conflict, while another part was exposed to conflict but not affected by occupation. The study relies on rich and detailed individual-level panel data and estimates the effects through a difference-in-differences (DiD) approach.

This research considered what happened *during* the occupation as well as what happened *after* the occupation, thereby evaluating both the short and long-term impact of exposure to Boko Haram's occupation on schooling. With respect to the first, the results indicated that the occupation of Boko Haram lead to decreasing educational outcomes for children of mandatory school-going age relative to those who were not exposed to the groups' rule. To be precise, these children suffered a set-back in education of 9 months due to the occupation that lasted, on average, 11 months. Moreover, those who share an identity with the governing rebel group might be more likely to stay out of school. Similarly, experiencing social pressure to conform to the occupying groups' rule, as well as by living in an area with heightened levels of support for the rebel group, leads to a decrease in a child's schooling. In turn, being exposed to violent enforcement of Boko Haram's ban on schooling, in addition to their occupation, lead to higher compliance with the groups' rule: those children have significantly lower educational outcomes than others. Interestingly, exposure to 'general' violence, not aimed at schools and education, did not have a similar effect.

Considering the long-term impact of occupation, the evidence suggested that children are 29% less likely to attend school, with especially female children being at risk of permanently dropping out of school. Those who shared an identity with Boko Haram, and during the occupation showed higher rates of compliance with the groups' rule, are more likely than other children to continue to stay out of school after the occupation has ended. When controlling for this effect of shared identity, children from the treatment group that experienced social pressure to conform are more likely to be returning to school in the long-run, after having dropped out in the short-run. Furthermore, having experienced enforcement of the anti-educational rule seems to have lead to intimidation and fear: those who have been exposed to such violence are significantly less likely to be returning to school. Importantly, well-documented mechanisms through which conflict and violence affect education did not seem to explain the negative impact on education: this strengthens the notion that the effect of the occupation is correctly identified, and the estimates are not biased by the insurgency in general.

Decreasing schooling outcomes can suppress the human capital accumulation of an entire generation and thereby the economic development of states. This study demonstrated that educational outcomes are severely affected by occupation of an Islamic insurgent group, on top of the already negative impact of conflict. Moreover, the results showed that the effects of occupation are not just strong but also persistent, and remain after the group has retreated and the government has regained control – emphasizing the role that can be played by policy and aid aimed at encouraging and enabling education in conflict settings. Finally, the effect of occupation varies across groups and over time, and cannot be explained by well-known mechanisms found in the literature. This paper presented a new approach to considering the various ways that conflict can affect schooling outcomes of children. It provided insight into the role that identity, social pressure, and enforcement play with respect to how and to what extent various individuals are affected by the occupation, identifying what children might be most at risk for experiencing a large and permanent educational

losses. Clearly, to develop efficient peace-building and post-conflict development policies that target and support individuals correctly, more detailed insight into such complex and multi-layered situations is needed. This study forms a first step in that direction.

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A. Appendix

A.1. Robustness tests

The table below contain the baseline results for the varying control groups. The first sample consists of all children (adhering to the same restrictions as for the sample of the study) living in the entire North East. The second sample consists of all children – again, selected based on similar restrictions – living in any state that faced the State of Emergency as declared in May 2013 (Yobe, Adamawa and Borno).

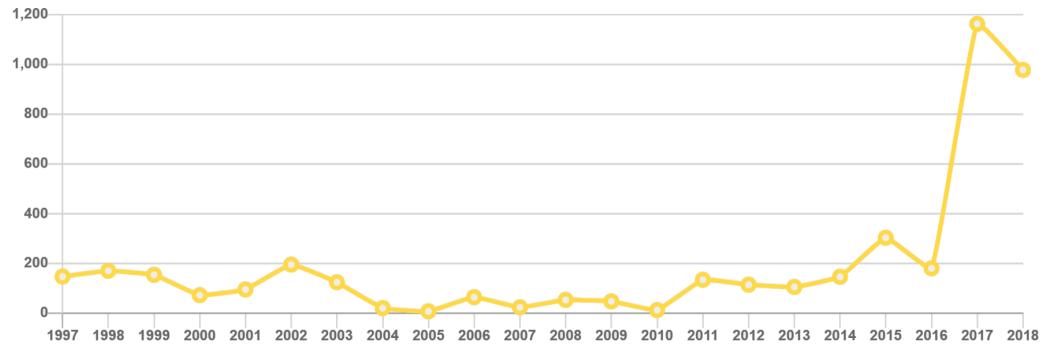
Table A.8: Robustness test of the effect: different samples

	<i>Sample 1: North East</i>		<i>Sample 2: State of Emergency</i>	
	Change in YoE	School attendance	Change in YoE	School attendance
Occupation	-0.784*** (0.291)	-0.236** (0.101)	-0.685** (0.285)	-0.229** (0.104)
Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes	Yes
<i>N</i>	5364	6497	2610	3148
Clusters	55	55	28	28

Note: The table shows the estimation of the treatment effect, being exposed to Boko Haram's occupation, on change in YoE and school attendance for two different samples. Standard errors, clustered on LGA, in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

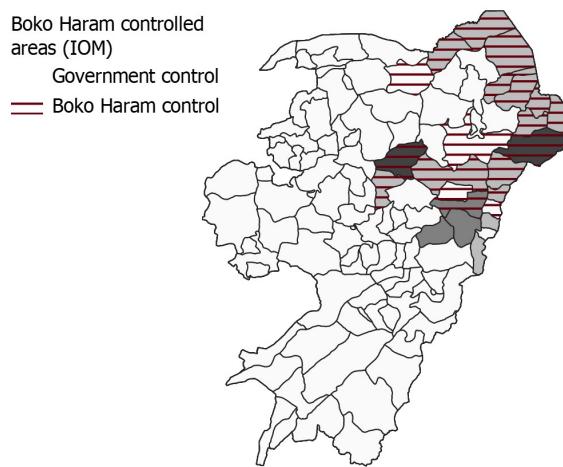
A.2. Figures

Figure A.3: Number of conflict events where territory is captured



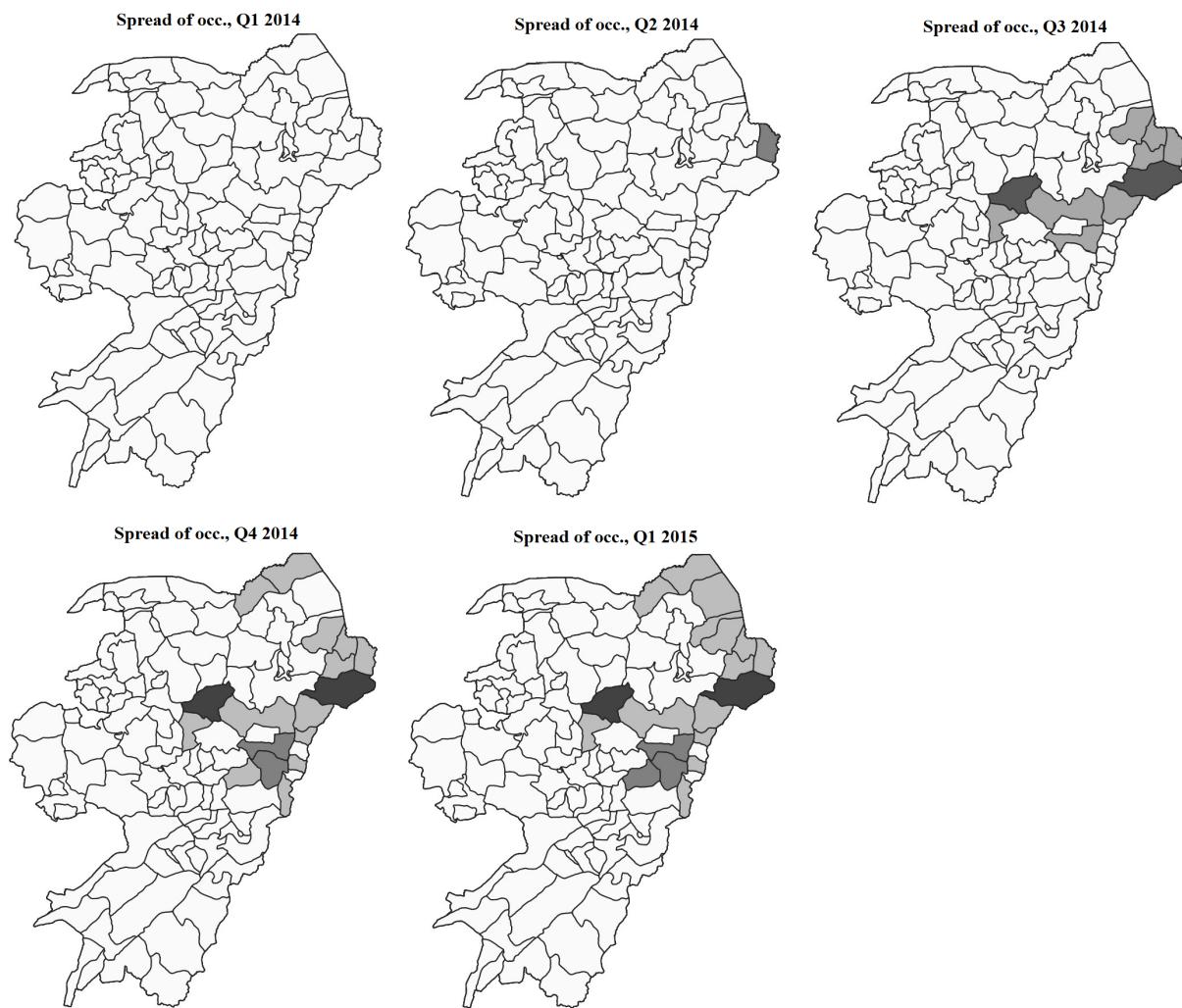
Note: The graph shows the total number of conflict events, per year, where territory was captured by non-state actors. Source: ACLED.

Figure A.4: Occupation of territory by Boko Haram: ACLED and IOM (2015)



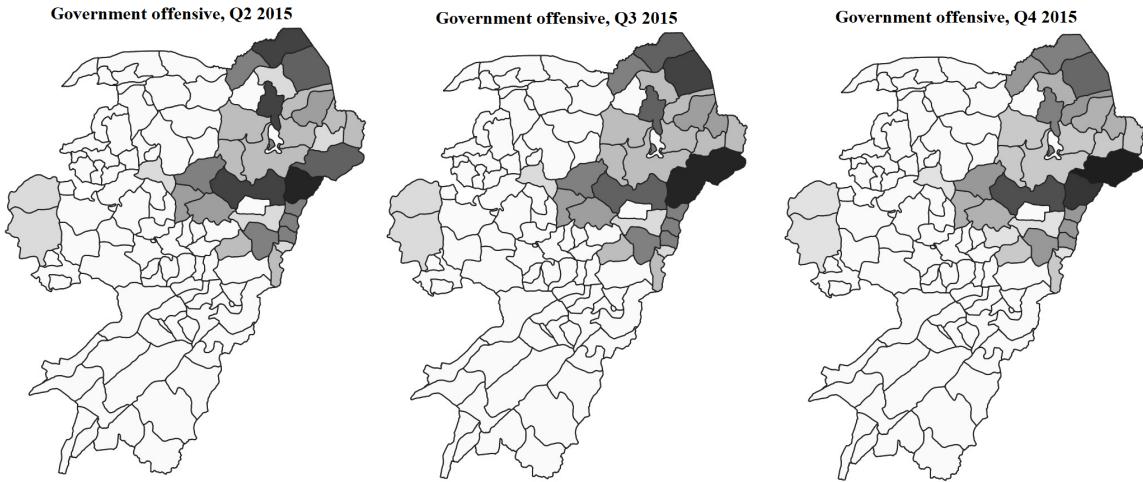
Note: Maps shows the occupation of territory by Boko Haram in Q1 of 2015, the height of the occupation, as well as the areas that were occupied by the group according to the IOM (striped red). The darker, the more events took place where Boko Haram gained control over territory as recorded by ACLED by quarter/year.

Figure A.5: The progression of the occupation of territory in North-East Nigeria by Boko Haram.



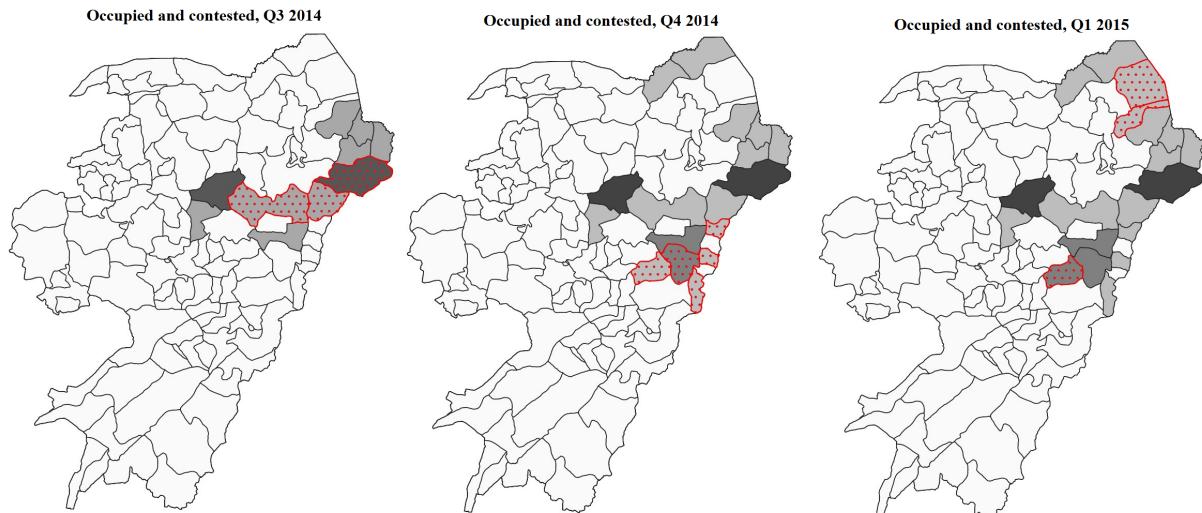
Note: Maps shows the progression of the occupation of territory by Boko Haram. The darker, the more events took place where Boko Haram gained control over territory as recorded by ACLED by quarter/year.

Figure A.6: Government offensives to retake territory



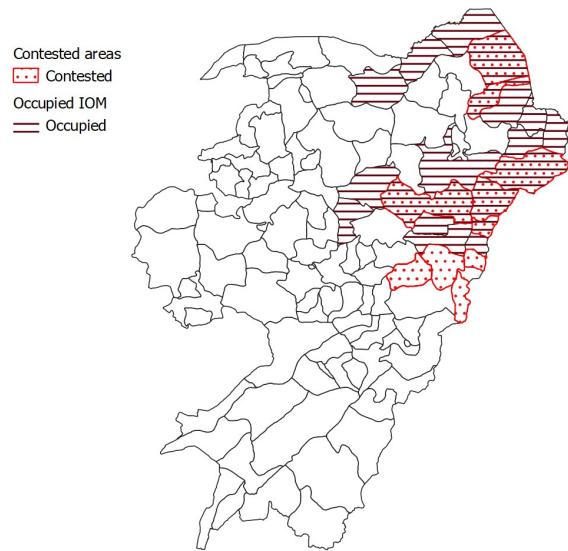
Note: Maps shows the progression of the government offensives to retake territory from Boko Haram. The darker, the more events took place where the government regained control over territory as recorded by ACLED by quarter/year.

Figure A.7: Contested and occupied territory in North-East Nigeria



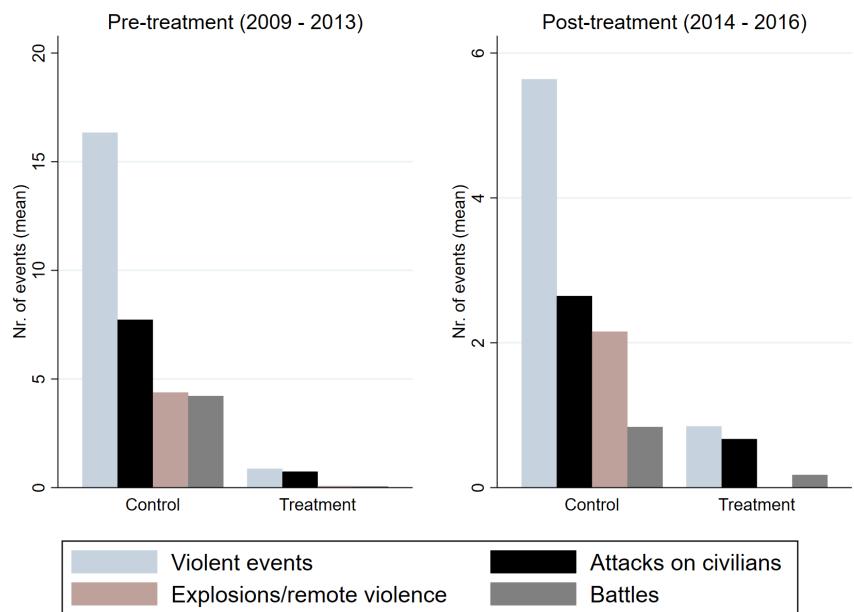
Note: Maps show the number of events, per LGA, where the Boko Haram gained control over territory as recorded by ACLED by quarter/year. "Contested" implies that in that same quarter/year there was at least one event where the government (re-)gained control over territory. The darker the LGA, the higher the number of events that took place in that time period whereby Boko Haram gained control over territory.

Figure A.8: Contested and occupied territory in North-East Nigeria



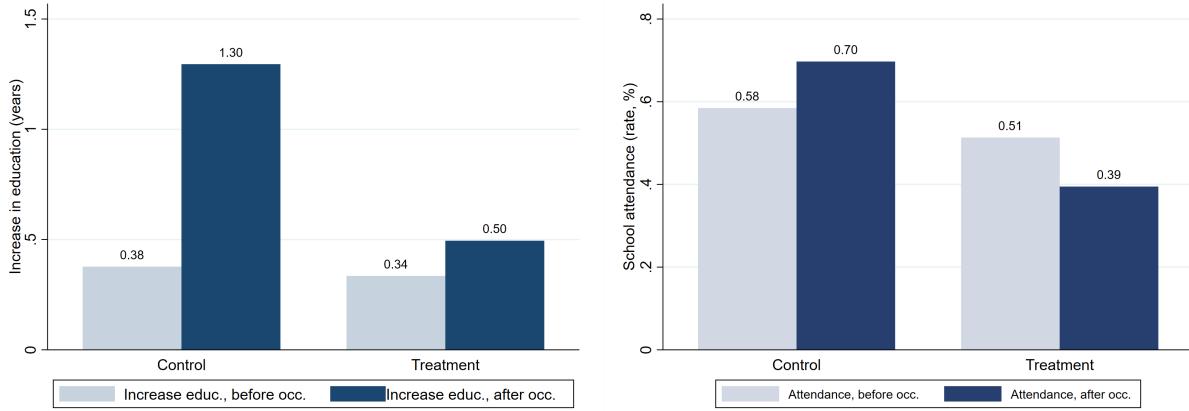
Note: The map shows the areas that were contested based on data from ACLED (see A.7) and the areas that were occupied according to the IOM (2015).

Figure A.9: Violence



Note: The graphs show the sample average levels of violence (measured as the number battles, attacks on civilians, or explosions/remote violence occurring in a 10km radius of the household) for the treatment or control group in the years prior to the treatment (2009 - 2013) and for the post-treatment period (2014 - 2016).

Figure A.10: Change in YoE and school attendance



Note: Sample averages of the two main dependent variables of this study, change in YoE and school attendance, for the treatment and control group.

A.3. Tables

Table A.9: Descriptive statistics of treatment and control group

Variable	Mean of control group	Mean of treatment group	Difference	T-test
Household head works in agri.	0.081	0.075	0.006	0.384
Household size	10.171	8.210	1.960***	8.192
Female	0.418	0.504	-0.086**	-3.013
Nr. daughters	0.224	0.197	0.027**	2.637
Nr. sons	0.267	0.295	-0.028*	-2.404
School-going age	0.710	0.634	0.076**	2.896
Muslim household	0.734	0.629	0.103***	4.024
Age	8.905	8.865	0.040	0.185
Rural	0.671	1	-0.329***	-13.493
<i>N</i>	1948			

Note: Means and standard errors (in parentheses) of the control variables used in the analysis, for both the treatment and control group. Difference between the means in column four, t-test in column five. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.10: LGA level differences

Variable	Control	Treatment	Difference	T-test
Centralization #	0.240	0.667	-0.428	-1.689
Muslim super-majority				
Ruggedness	215015.1	3798684	-3583669**	-2.998
Density	275.586	70.060	205.526	.472
Distance to Sambisa forest	299.199	150.25	148.949*	2.422
<i>N</i>	16			

Note: The table shows the averages for the control and treatment group for various measures on LGA level. Difference between the means in column four, t-test in column five. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.11: Community level differences

Variable	Control	Treatment	Difference	T-test
Primary school	0.857	1	-0.143	-1.183
Secondary school	0.600	0.889	-0.289	-1.568
Health center	0.667	1	-0.333*	-2.049
Public hospital	0.333	0.375	-0.042	-0.204
Pharmacy	0.211	0.125	0.086	0.505
Post office	0.191	0.125	0.066	0.404
Bus stop	0.583	0.625	-0.042	-0.196
Bank	0.150	0	0.150	1.145
Police station	0.550	0.750	-0.200	-0.969
Market	0.619	0.889	-0.270	-1.483
Fire station	0.105	0.286	-0.181	-1.115
<i>N</i>	31			

Note: The table indicates whether, on average, a public good is present in the community (0 = not present, 1 = present) prior to the occupation. Data is based on the surveys conducted in 2010 and 2012. Difference between the means in column four, t-test in column five. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.12: Infrastructure within communities across LGAs, post-treatment

Variable	Control	Treatment	Difference	T-test
Primary school	0.977	0.960	0.017	0.934
Secondary school	0.951	0.920	0.031	1.216
Health center	0.737	0.875	-0.138	-0.814
Public hospital	0.105	0.125	-0.020	-0.143
Pharmacy	0.325	0.167	0.158	0.876
Post office	0.132	0.25	-0.118	-0.760
Bus stop	0.342	0.354	-0.012	-0.065
Bank	0.833	0.750	0.083	.347
Police station	0.767	0.042	0.726***	4.820
Market	0.254	0.167	0.088	0.519
Fire station	0.588	0.500	0.088	0.439
<i>N</i>	101	8		

Note: The table indicates whether, on average, a public good is present in the community (0 = not present, 1 = present) after the occupation. Data is based on the surveys conducted in 2015 and 2016. Difference between the means in column four, t-test in column five. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.13: Schooling

	Change school	School commute	School expenses (Naira)
Occupation	-0.063 (0.141)	0.036 (0.291)	1238.818 (1372.968)
Controls	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Individual FE	Yes	Yes	Yes
<i>N</i>	1127	676	841
Clusters	14	16	13

Note: The table shows whether having lived through Boko Haram's occupation caused children to change the type of school they attended (captured by a dummy variable), the time spent travelling to school (categorical variable, with 15 minute intervals) or the education-related expenses (in Naira) for the household. Standard errors in parentheses.* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.